Volume 35 No. 11 NOVEMBER 1948

Plating

THE MONTHLY REVIEW OF THE AMERICAN ELECTROPLATERS SOCIETY

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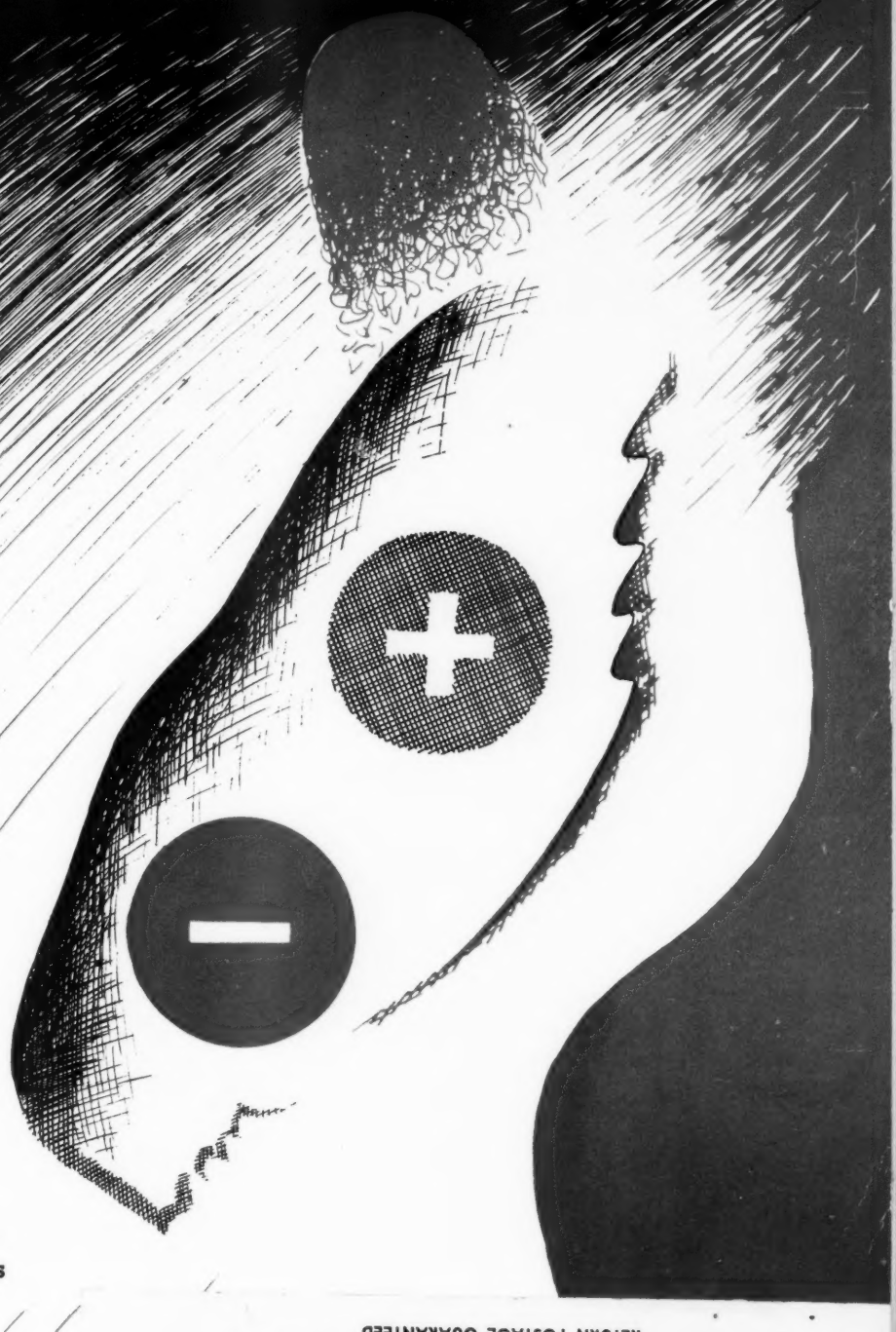

In this issue:

Surface Finishing of Stainless Steels
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Plating Room Costs
An Early Course in Electroplating
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Principles of Poor Speaking
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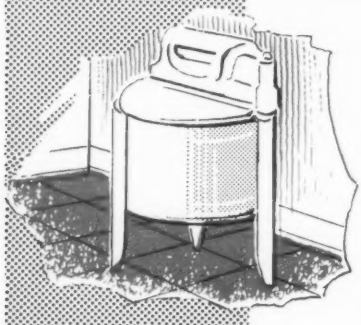
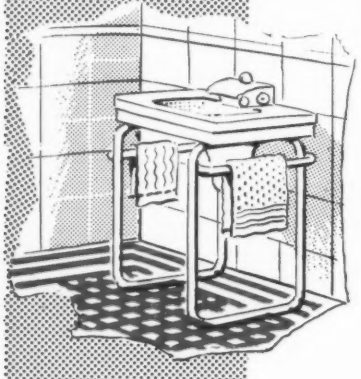
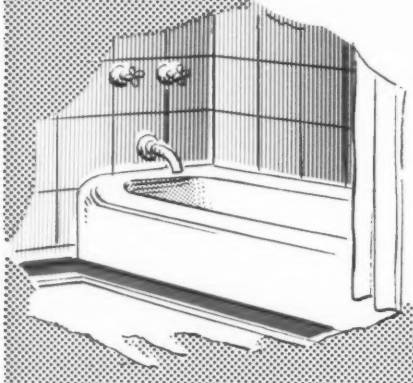
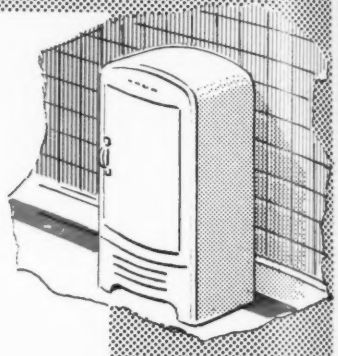
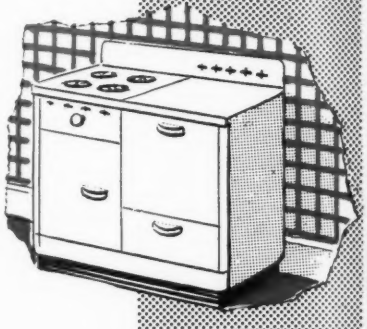
CLEANING PRIOR TO PORCELAIN ENAMELING

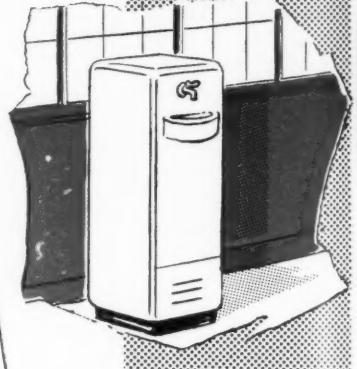












Production tests have shown that porcelain enamel rejects are reduced by using Clepo 26-E in the cleaning operation. The reason for these good results is that Clepo 26-E is very free rinsing and therefore does not interfere with the adherence of the nickel dip. Also Clepo 26-E has extremely high oil penetrating qualities so that even the most stubborn oils are completely removed in a one-minute cleaning time. Clepo 26-E is buffered so that the oil removed is kept in suspension and does not float on top of the solution.

If you would like to make arrangements for a production test in your plant right now, contact us as quickly as possible. The improved results obtained by using Clepo 26-E will amaze you.

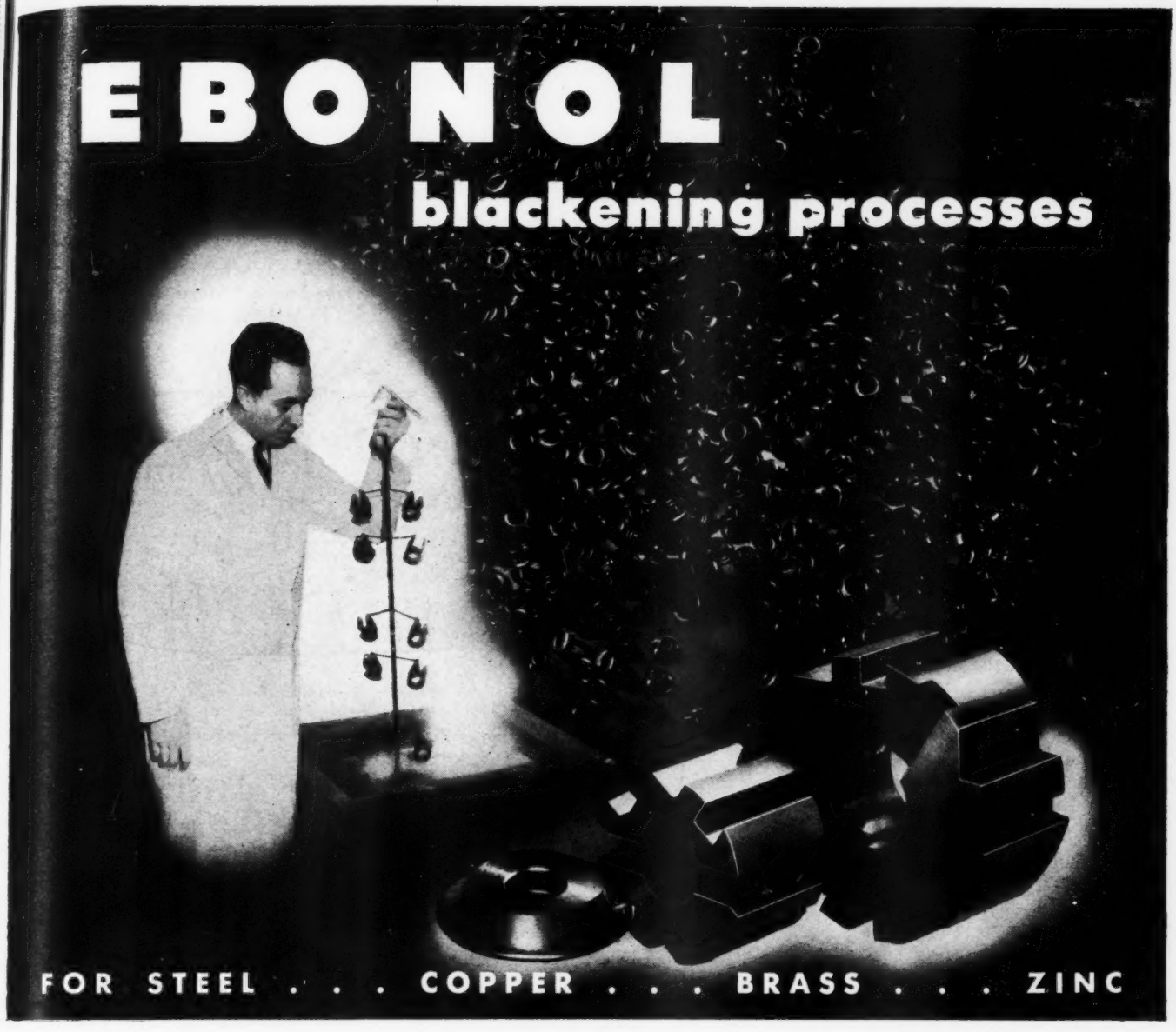
Memo to Plant Engineer:

To Reduce Porcelain Enamel Rejects Specify Clepo 26-E for Cleaning prior to Nickel Dipping

FREDERICK GUMM *Chemical Company Inc.*

538 FOREST STREET, KEARNY, N.J.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 760.



Enthone Ebonols today give new beauty, increased wearability and better functional qualities to hundreds of metal products.

The field is widely diversified: metal screens, cameras, business machines, machine tools, buttons, nameplates, dress trimmings, compacts, automobile hardware and accessories, etc.

EBONOL-C. (U. S. Patent 2,364,993) This is the best method of blackening and coloring copper and its alloys. Durable black cupric oxide is produced in a simple solution. Any metal that can be copper plated can also take this finish.

EBONOL-S. A one-bath method of blackening steel. Temperature 285 to 290° F. Simple to use and pleasant to run.

EBONOL-Z. A simple process for blackening zinc plate and zinc base diecastings. Beautiful glossy or dull finishes are achieved at low cost and trouble-free operation.

NEW TUMBLING TECHNIQUES are available for blackening and coloring. Send samples for free finishing demonstrations together with advice of experienced research chemists. *Write for new literature with procedures.*

ENTHONE INC., 442 Elm Street, New Haven, Conn.

ENTHONE

Industry News

Cro-Plate Company of Hartford, Conn., was given a 2-column write-up in the July 24 issue of Business Week. Plating tools and gages with a tolerance of 0.00002 inch, it is claimed to have eliminated regrinding and lapping. Porous chromium plate is said to be produced by electrolytic etching through a screen placed over the smooth surface.

This company is also producing chromium plated bearing races and balls on a pilot plant scale and hope to compete with stainless steel bearings in the future; merchandizes a method for direct chromium plating on aluminum; and has started selling small chromium plating installations; all in all quite an accomplishment by two young men, 26-year-old Theodore L. Brantly, Jr., and 30-year-old Alan W. Brown, who started about a year ago on a $1,500.00 shoestring.

Finishing of Television Parts. Television set producers are adding eye-appeal to their cabinets by means of decorative metal escutcheons and trim. The pieces illustrated and similar items are being produced by the American Emblem Com-

pany, Inc., Box 116-AH, Utica 1, N. Y., for Crosley, Du Mont, General Electric, Philco, R. C. A., and other television manufacturers and represent the combined effort of the cabinet designers and the Emblem Company engineers. These are typical of the wide variety of nameplates, insignia, emblems and decorative metal parts this company produces for all types of industrial and commercial applications.

The Tuscaloosa, Alabama Plant of The B. F. Goodrich Company will soon engage in rubber lining of tanks, tank cars, pipe and other equipment. Construction of the building to house the new operation will begin at once. It will be erected near the company's tire and tube plant and will contain about 7,200 square feet of floor space.

Most of the rubber lining work will be done at the Tuscaloosa plant. However, some of the larger jobs require B. F. Goodrich peronnel to do the lining "on location".

Detrex Corporation, Detroit 32, Mich., now offers a complete line of cleaning, equipment and chemicals for both production and maintenance cleaning in the automotive and aviation service field. Distribution to this field will be through a selected group of jobber representatives in strategic market locations. Products to be marketed immediately include: solvent-vapor degreasers, parts washers, cleaning tanks, non-flammable degreasing solvents, alkali cleaning compounds, detergents, emulsion cleaners, paint strippers, spray booth materials, masking compounds, and shampoo-type cleaners.

Materials Handling Show. The Third National Materials Handling Show will be held in Convention Hall, Philadel-

Published monthly at 5800 N. Marvine St., Philadelphia 41, Pa. Entered as second class matter July 1, 1946, at the Post Office at Philadelphia, Pa., under Act of August 24, 1916. Copyright, 1948, by the American Electroplaters' Society, Inc. Subscriptions: Domestic and Canada, $4.00 per year 50c per copy; Foreign, $6.00 per year, 75c per copy.

For Assured Protection Against Corrosion

• Proved over a ten-year period, Tygon plastic Paint coatings offer effective, low cost protection for plant structures and equipment. Resistant to most acids and alkalies (as well as to water, oils, and alcohols) through a temperature range as high as 190° F, Tygon Paint is as easy to use as most ordinary paints. It dries quickly, by solvent evaporation . . . forms a tough, durable, flexible, tight-adhering plastic "skin" that will not chip or flake off, will not oxidize or chemically deteriorate with age.

Write for free copy of Bulletin 709X showing corrosives handled, color range and detailed technical information. Address Plastics & Synthetics Division, The U. S. Stoneware Co., Akron 9, Ohio.

U. S. STONEWARE

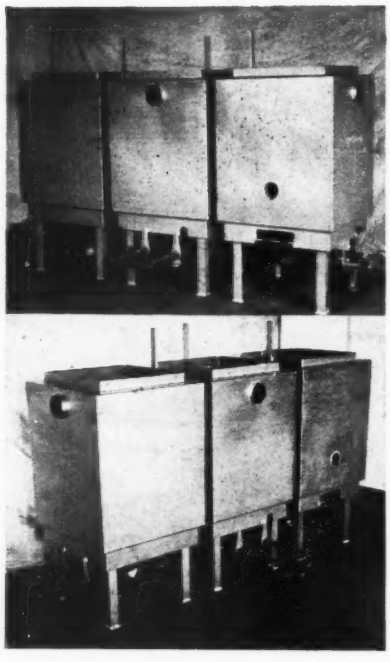
Since 1865 • Akron 9, Ohio

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 762.

Corrosion always costs more than protection

"Specify Stortswelded semi-precious metal tanks to avoid maintenance and replacement expense."

The special purpose Stortswelded tanks illustrated comprise an interior tank of nickel-clad steel surrounded on four sides by a hot air chamber, which in turn is surrounded by an insulating blanket. Openings are solid nickel. The construction affords complete rust protection for delicate recording instruments being tested at high temperatures. The general design provides utmost fuel economy and close temperature control.



Make sure that your tank equipment is engineered and designed to be free from corrosion troubles—and thereby free from future drains on your budget for maintenance and replacement. Storts engineering staff will gladly assist you.

STORTS WELDING COMPANY
INCORPORATED
42 Stone Street Meriden, Conn.

Manufacturers of Welded Fabrications to Specifications

Industry News

phia, on January 10–14. The exposition is devoted to various systems of handling materials in production and shipment. Among the many types of equipment to be exhibited will be hand trucks, lift trucks, conveyors, hoists, monorails, portable elevators, stacking units, cranes, tractors, trailers, fork trucks, skids and pallets, and their respective accessories.

The show will be one of the five largest industrial expositions to be held in this country, it has been stated. One hundred and ninety-two companies have leased 96,725 square feet of net exhibit space and the remaining 16,000 feet are expected to be occupied when the show opens.

This year the show will be jointly sponsored by the management and materials handling divisions of the American Society of Mechanical Engineers and the Materials Handling Institute. The A. S. M. E. groups will conduct a five-day Conference on Materials Handling concurrently with the exposition. A Materials Handling Theatre will exhibit late films on handling subjects.

Admission to both the exhibits and the conference will be by registration. No charge will be made. Advance registration cards may be obtained from Clapp and Poliak, Inc., 350 Fifth Avenue, New York 1, N. Y. Hotel reservations may be obtained through the Secretary, Housing Bureau, Materials Handling Show, 17th and Sansom Streets, Philadelphia 3, Pa.

West Coast Survey. A survey of manufacturing facilities and markets on the Pacific coast has recently been made by R. A. Emmett, President, and A. O. Thalacker, Vice-President and General Manager of Detrex Corporation, Detroit 32, Mich. While spending the month of September on the West coast, they made their headquarters in Detrex offices in Los Angeles and San Francisco. Important on their agenda was to find means for improving service to customers of Detrex cleaning equipment and chemicals. Being officers of Hooker-Detrex, Incorporated, they also visited the solvent manufacturing plant in Tacoma, Wash.

The Houston Branch of The Foxboro Company, Foxboro, Mass., was moved on October 15 from the Sterling Building to an attractive new building on 2518 South Boulevard, Houston 6, Texas. Conveniently located in a rapidly developing section of the city, it will provide excellent facilities for the sale and servicing of Foxboro products, with the added advantages of space for warehousing and ample accommodation for parking.

Leo W. Parten, District Manager at Houston, continues in charge, directing the corps of sales engineers who serve the

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EXTRA POLISHING PROFITS *Now Yours!*

with amazing cement that boosts polishers' production an average of 47% more pieces per head!

THERE'S GOOD REASON why leading polishing plants everywhere are switching to GRIPMASTER Polishing Cement. Actual experience, under toughest conditions, proves that GRIPMASTER *lowers costs* and *increases efficiency.*

HOW GRIPMASTER PUTS YOU "MONEY AHEAD"

You get far longer life with each coating when you use GRIPMASTER . . . thanks to GRIPMASTER'S special high-heat resisting ingredient. You have fewer stops for wheel changes because GRIPMASTER *locks in* the grains of emery with "vise-tight" control.

WHY GRIPMASTER IMPROVES QUALITY

You get better quality finishes with GRIPMASTER because GRIPMASTER'S *greater flexibility* gives more and finer "breaks" when the wheel is "cracked."

MEETS EVERY NEED

GRIPMASTER gives ideal results on all metals . . . ferrous and non-ferrous . . . on plastics, too. No special equipment or apparatus needed to set up with GRIPMASTER.

THERE'S A JOBBER NEAR YOU!

ONE does it!

No need to carry umpteen grades of polishing adhesives when you use GRIPMASTER. Here's why: GRIPMASTER'S one grade grips *all* grains —300 to 20. No special sizer needed.

SAY GOODBYE

To "S.O." There's no Stockyards Odor in Gripmaster. It's clean, odor-free!

FREE GENEROUS SAMPLE

"First Choice of the World's Best Finishers"

GRIPMASTER
PATENTED
POLISHING CEMENT

for POLISHING WHEELS
ABRASIVE BELTS

SPECIAL OFFER TO READERS

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IN CANADA:
H. C. Nelson Chemicals, Ltd.
Windsor, Ontario

☐ Send us a generous FREE SAMPLE of Gripmaster.

☐ Send us data on how to boost polishing production
( ) on belts ( ) on wheels

COMPANY_____

ATTENTION_____

ADDRESS_____

CITY_____ STATE_____

"Alodine" solved the problem of paint durability on aircraft. Alodizing provides excellent paint adhesion as well as unusual protection for the metal.
Photograph courtesy of Stinson Division, Consolidated Vultee Aircraft Corp.

Alodized
ALUMINUM
(Coated With "Alodine")
ANCHORS THE FINISH
PROVIDES A NEW ORDER OF DURABILITY IN METALS

"Alodine" is effectively applied by dipping -- in simple immersion equipment; by spraying -- in power washer equipment; or by brushing.

In 2 minutes or less--and at low cost -- "Alodine" developes on aluminum a highly protective corrosion-resistant coating and an excellent paint bond. No electricity is required and the bath operates at a low temperature. Alodizing is adaptable to either small or large plant operation -- to either continuous or intermittent production.

For a lasting paint bond and the utmost in metal protection, specify Alodizing and Alodized aluminum. Write or call for further information.

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING
Granodine *
Duridine *
Alodine *
Lithoform *
Thermoil-Granodine *

RUST REMOVING AND PREVENTING
Deoxidine *
Peroline *

PICKLING ACID INHIBITORS
Rodine * ®

Pioneering Research and Development Since 1914
AMERICAN CHEMICAL PAINT COMPANY
AMBLER, PA.
Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

Industry News

large and important territory for industrial instruments, control valves, and similar equipment for the measurement and control of process variables such as temperature, pressure, humidity and flow.

Patents Licensed. The du Pont Company is listing a number of its patents on the Patent Register of the U. S. Patent Office as available for licensing. Not less than 4,260 patents, which are about two-thirds of the patents the company owns and cover many phases of its diversified operations, have been submitted. The first official listing of du Pont patents is expected to appear in an early issue of the Patent Office Gazette.

The Public Register of Patents Available for Licensing has been in effect since June, 1945. Du Pont pointed out that registration marks no particular change in its policy as, over the years, the company has licensed many of its patents.

New Battelle Laboratories. To house additional laboratories required for its expanding research, Battelle Institute, Columbus, Ohio, will begin construction of a new half-million-dollar laboratory building late this year. The structure, according to Battelle Director Clyde Williams, is scheduled for completion in 1949.

This major addition to the Institute will be the largest of four laboratory structures erected since World War II. A three-story structure, it will be built of concrete and steel with brick veneer finish and will harmonize in architectural detail with other Institute buildings. Located on Seventh Avenue, in Columbus, adjacent to the present Seventh Avenue Building, it will contain space for 103 unit laboratories, plus large open areas for pilot-plant operations. It will contain approximately 80,000 square feet of space.

The Magnuson Products Corporation, of Brooklyn, N. Y., manufacturer of the well-known Permag Cleaning Compounds for industrial purposes, celebrated its twenty-fifth anniversary last month.

More than 350 distinct products are now being distributed throughout the United States and Canada to the cleaning-compound and detergent trade, which embraces the automotive, textile, dairy, food processing, transportation, paper mill, metal working and many other large industries.

The success of the enterprise has been largely due to the integrity and sound business judgment of its founder, Edward Magnuson, and his faithful associates who have guided the concern through the years of prosperity and adversity. Mr. Magnu-

Electroplating Machines *tailored to fit*

Typical installation of Meaker Return Type Full Automatic Plating Machine

Equipment tailored to fit your own requirements is the only way to handle electroplating on a production basis. The Meaker method applies equally well to plants with only a moderate daily output and to the largest and heaviest automatic plating needs of the automotive industry. It offers a simple way to obtain uniformity in results.

Meaker Automatic Conveying Equipment is engineered and built for continuous use with minimum maintenance. It incorporates a flexibility for timing and synchronizing the various steps of the complete process.

Whatever your electroplating requirements, either small or heavy parts, the Meaker method offers the practical way for economical, quality production.

★ *Full Automatic and Semi-Automatic Electroplating Equipment*

★ *Strip Steel Plating Equipment*

★ *Wire Galvanizing Equipment*

★ *Strip Steel Electrocleaning Lines*

★ *Pickling Machines*

★ *Processing Conveyors*

★ *Motor Generators for Plating*

★ *Rectifiers for Plating*

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Serving the Plating Industry with the Best, Most Up-to-Date Equipment

THE MEAKER COMPANY

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THE Siefen System*

SPRAY EQUIPMENT
SPRAY COMPOUNDS
SPRAY SERVICE

* This is one of a series of messages describing the modern way of applying buffing and polishing compounds on revolving wheels. Rapidly becoming known as "The Siefen System" this system, based on Equipment, Compounds, Service, will step up your speed and efficiency while materially reducing your costs.

BUFFING AND POLISHING COMPOUNDS

SIEFEN compounds, such as Nuglu and Brushing Nuglu have been well-known and widely accepted for years. For the Siefen System new compounds have been developed.

Nu-Spra-Glu and Buffing Nu-Spra-Glu are familiar to many of you. These new and constantly improved compounds together with Siefen equipment and service will give you better work faster and at great savings.

REMEMBER—
The Siefen System

1. SIEFEN EQUIPMENT
2. SIEFEN COMPOUNDS
3. SIEFEN SERVICE

J. J. SIEFEN COMPANY
5635 LAUDERDALE • DETROIT 9, MICHIGAN

Industry News

son was born in Sweden and came to the United States in 1910 after having followed an adventurous sea career. He is

Magnuson

recognized as a generous and active supporter of Swedish-American causes and projects; the Swedish Hospital in Brooklyn, of which he is president, is one of his major interests.

Permag Products' factory is located on Third Street, Brooklyn, N. Y., in a substantial brick building together with huge storage and warehouses for handling the fast expanding business. More than 125 employees and a large sales organization in chief cities of the country comprise the force that carry on production and distribution. A competent technical service is part of the Magnuson establishment and does the research work in the development of formulae and compounds for special problems.

In Canada, the Canadian Permag Products, Ltd., look after requirements of Canadian users of Permag. Representatives and warehouses are located in Montreal and Toronto.

POSITION DESIRED IN EAST

Manufacturers' representative with eight years' experience in degreasing, washing, processing equipment and chemicals. Now located in Mid-West, from East, wish to relocate there. College major in chemistry. Age 32. Salary open for opportunity in industrial sales.

Reply to:

P-11 A, PLATING
P. O. Box 168, Jenkintown, Pa.

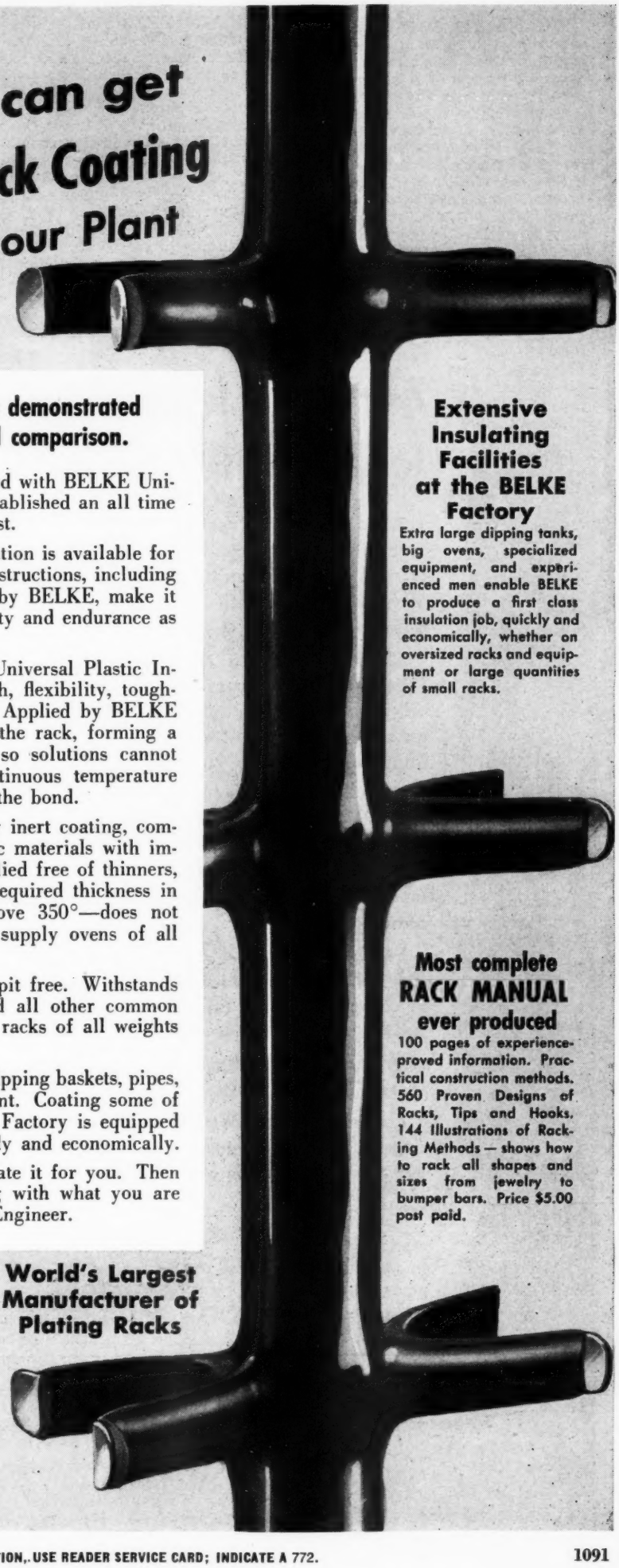
NON-CONDUCTIVE PLATER

I am a young man with existing large factory, and practical knowledge, also commercial abilities in connection with electro-plating on plastics, glass, china, paper, everything in connection with non-conductive articles.

I wish to correspond with firms already established in metal plating in the United States of America. Samples sent and further details if requested.

B. BERGER
22, Farm Avenue
London, N. W. 2, England

NOW you can get BELKE'S Special Rack Coating for Application in Your Plant



Its Use on Thousands of Racks has demonstrated efficiency and long service beyond comparison.

The tremendous service life of racks coated with BELKE Universal Plastic at the BELKE Factory has established an all time record in long life and low maintenance cost.

Now, this BELKE-Perfected Plastic Insulation is available for application in your own plant. Complete instructions, including secret techniques, developed and perfected by BELKE, make it possible to obtain the same insulating quality and endurance as the BELKE-Applied Coatings.

In all kinds of plating service BELKE Universal Plastic Insulation has demonstrated adhesive strength, flexibility, toughness and resilience never before equalled. Applied by BELKE processes, the coating literally grows into the rack, forming a union of incredible strength, and sealing so solutions cannot penetrate between coating and rack. Continuous temperature changes and flexing of tips do not weaken the bond.

BELKE Universal Plastic is a chemically inert coating, combining the foremost developments in plastic materials with improvements perfected by BELKE. It is applied free of thinners, reducers or solvents. Coats uniformly to required thickness in one dip. Heat cured at temperatures above 350°—does not soften in hot plating solutions. (We can supply ovens of all sizes.)

The Coating is smooth, non-porous and pit free. Withstands chrome, nickel, cadmium, zinc, copper and all other common cleaning and plating cycles. Excellent for racks of all weights and sizes.

The Coating is also very good for tanks, dipping baskets, pipes, fans, tools and other plating shop equipment. Coating some of these units is very difficult. However, Our Factory is equipped to coat units of all shapes and sizes, quickly and economically.

Just send a sample rack and let us insulate it for you. Then compare BELKE Universal Plastic Coating with what you are using. Or ask us to send a BELKE Service Engineer.

Extensive Insulating Facilities at the BELKE Factory

Extra large dipping tanks, big ovens, specialized equipment, and experienced men enable BELKE to produce a first class insulation job, quickly and economically, whether on oversized racks and equipment or large quantities of small racks.

Most complete RACK MANUAL ever produced

100 pages of experience-proved information. Practical construction methods. 560 Proven Designs of Racks, Tips and Hooks. 144 Illustrations of Racking Methods — shows how to rack all shapes and sizes from jewelry to bumper bars. Price $5.00 post paid.

World's Largest Manufacturer of Plating Racks

Belke MANUFACTURING CO.
947 North Cicero Ave. Chicago 51, Illinois
EVERYTHING FOR PLATING PLANTS

THE NATION STANDS a good chance of slipping on a living room rug and falling flat on its face, if a safety survey of a half-million school children is any indication.

Conducted by the Greater New York Safety Council, the survey gave the youngsters a series of safety situations to check—to see if they were followed in individual homes. Number one hazard, among those listed, was small rugs on slippery floors, not tacked down and not made skidproof.

Last year the survey—one of the largest conducted in the country — showed the ... was improper ... mable materia... line, kerosene a...

Second most ... the children sai... bers of their ... doors and bure... diately after y... surprising nu... ies, the safety...

In third pla... mable liquids ... ing, and in the ... of sturdy bases ... on when reach...

Families w... in leaving m... small children...

The childre... windows unsc... could fall out... ported a bump... electric cords ... starters.

Explosion ... Down Base...

A heater e... the basement a...

Mrs. Reec... out of her cha... on the first ... foot of the ... floor. A phy... bruises and sh...

The oil heate... blast knocke... between the b... and tore the g... hinges. The ki... ripped loose.

The dining ... knocking over ... were called, b... flames.

Jap Croc... First Ti...

Ship manifes... Maritime Exch... the arrival he... ware for the... war.

The Norwe... brought 30 ca... well as 32 cas... necklaces.

The British ... brought 4,500 cases of sheet rubber from Batavia, Netherlands East Indies.

EXPENDITURES for maintenance and repair of existing buildings are expected to total about $6 billion in 1948, about the same figure as in 1947, according to a forecast prepared by the economists of Producers' Council, David S. Miller, Council president, stated today. The Producers' Council, Inc., is a national organization of manufacturers of building materials and equipment.

"With repair work included, the total volume of all building next year, including new construction, is expected to approximate $20 billion," Dr. Mil... said.

The co... 000 gallon... and used ... said. The ... has been ... the use o... cubic fee... kitchen ra...

The co... the U. S. ... tankers t... oil here ... bought in ... company ... being pro... Coast.

City ice ... ge at ... compe... of 500,... plant. ... e mo...

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...a's mo... more ... whistle... d villa... n oil ... Warren ... ported ... 41 belo... he Stat... e, a tin... 35 belo... ton Stat... d an u... below ... in Willi...

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...ongress ...nuel C. ...itizens ...st Co., ...y's 7th ...e.

...at Inde... featured ...

Ba... ...strous armory fire more than 10 years ago.

Emergency squads of police were summoned to handle spectators who

Zorball cleans up local trouble spots

There's one safe, certain answer to the dangerous grease and oil spots you find around machines and on plant floors. It's ***Wyandotte Zorball,*** the all-purpose floor absorbent.

Zorball is easy and economical to use. A thin layer of this granular product absorbs oil, grease, water, paints and other liquids quickly and completely. It provides an immediate anti-slip surface underfoot.

Even when saturated, ***Zorball*** retains its original form. There's no caking, packing nor forming of "mud" to be tracked around the shop. It will not injure fabrics, wood, metals, rubber, or the skin of those who handle it.

Furthermore—and this is important—***Zorball*** helps prevent fire hazards. It is chemically inert and nonflammable . . . resists combustion even when oil-soaked.

Wyandotte Zorball is listed by Underwriters' Laboratories.

Ask your nearest Wyandotte Representative for complete information on ***Zorball.*** All you have to do is give him a call.

Trouble afoot? Why not try WYANDOTTE ZORBALL

Wyandotte REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION

WYANDOTTE, MICHIGAN • SERVICE REPRESENTATIVES IN 88 CITIES

Personals

Alex Stewart, Director of Research, National Lead Company, Brooklyn, N. Y., has been elected a director of the Industrial Research Institute, Inc.

George A. Meyers has been appointed to the sales organization of Frederic B. Stevens, Inc., in the Detroit Metropolitan Area.

Meyers, or "Hungry" as he is more intimately known among Detroit purchasing agents, is a bona-fide native Detroiter, actually born and raised in the Motor City. He was formerly purchasing agent for a well-known screw machine products company; since entering the selling field in 1933 he has been engaged principally in the selling of metal finishing products. He joins the Stevens organization with a background that well qualifies him for selling and servicing the Stevens line of buffs and buffing compositions in which he will specialize.

Raymond Hughes is now general superintendent of the Roberts Rouge Company, Stratford, Conn. Hughes, who enjoys an enviable record in the finishing field for developing and producing buffing compounds and rouges, comes from The Lea Manufacturing Company with which he had been associated for thirteen years.

George W. Pressell, Executive Vice-President of E. F. Houghton & Company, Philadelphia, celebrated forty-five years with that organization in June. During his forty-five years with Houghton, Pressell rose from a $2.00 a week messenger boy to his present position. In that time he worked up through such positions as personal office boy to the president, a variety of office jobs, chief chemist, general sales manager, director of sales, secretary, vice-president and executive vice-president.

Dr. Carl F. Prutton, formerly Head of the Department of Chemistry and Chemical Engineering at Case School of Applied Science, has joined Mathieson Chemical Corporation as Director of Research. He will have his headquarters in Mathieson's executive offices in New York and at the research laboratories in Niagara Falls.

Dr. Prutton was a faculty member at Case from the time of his graduation from that school in 1920 until 1948. He was a consultant to the Lubrizol Corporation from 1928 until he joined Mathieson and to the Dow Chemical Company from 1928 until 1941. From 1942 to 1944 he served as Chief of the Process Development Branch of the Office of Rubber Director and as consultant to the War Production Board.

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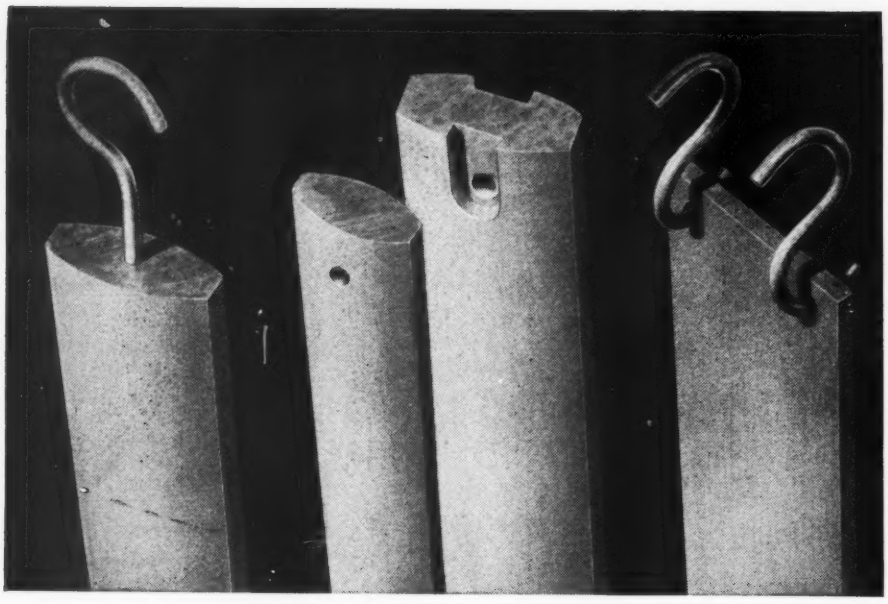

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Personals

E. B. Forse, at present Manager of the Refractories Division at Perth Amboy, has been appointed Assistant Vice-President of the Carborundum Company effective November 1, 1948. In this capacity, he will undertake special assignments relative to problems arising from the expanding markets for refractories and crude silicon carbide. For the present, his headquarters will remain at Perth Amboy. **C. E. Hawke,** Director of Sales, will become Manager of the Refractories Division with full responsibility for the direction of this important Division's sales and manufacturing. He will be succeeded by **E. R. Baxter.**

George A. Fish, Sales Manager of the Clover Manufacturing Company, Norwalk, Conn., was recently honored at a celebration of his thirty years of continuous service with the company. During this time he has travelled in every state of the country and has been in charge of the company's San Francisco and Chicago offices. He is held in high esteem throughout the coated-abrasive industry. Mr. Fish was presented with a check for $1,000.00 by the company and an engraved gold watch by his fellow employees.

Left to right: George A. Fish, Sales Manager; Irving S. Olmstead, Auditor; John Bowers, Mark Brown, E. B. Gallaher, President

D. J. Erikson, who started his career with Hagan Corporation as a draftsman more than three decades ago, has been elected President of Hagan and its subsidiary companies, Calgon, Inc., Hall Laboratories, Inc., and Buromin Company. He succeeds **J. M. Hopwood,** president of Hagan Corporation since 1918—the only man to pre-date Mr. Erikson in point of service with the company. Mr. Hopwood was elected to the new position of Chairman of the Board of Directors of the Hagan group.

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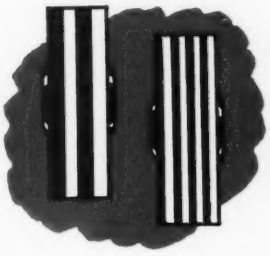

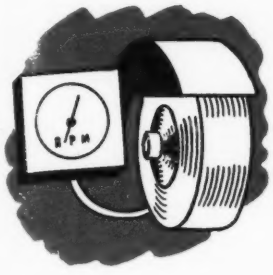

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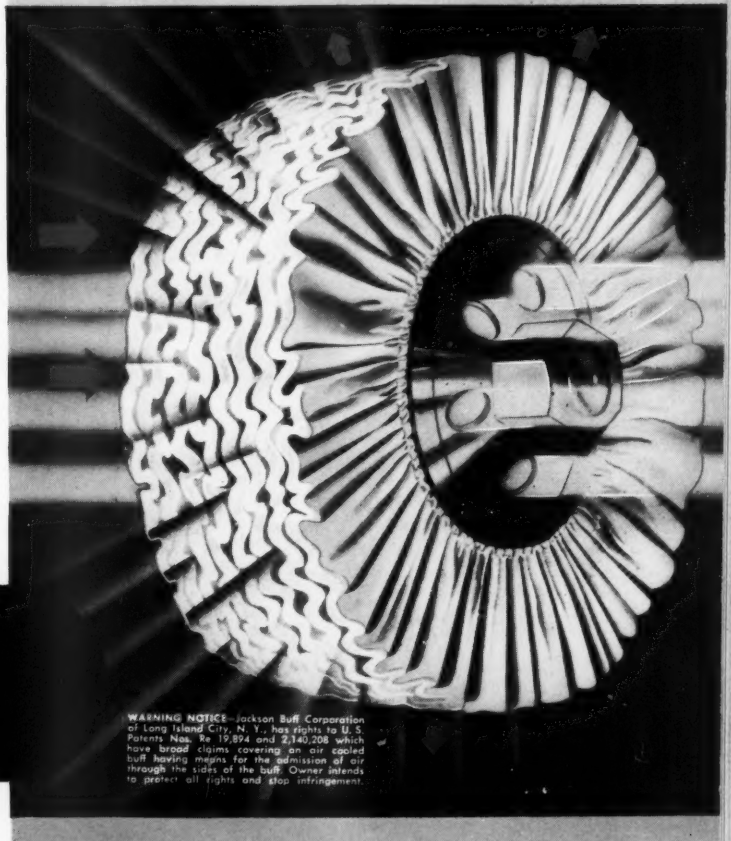

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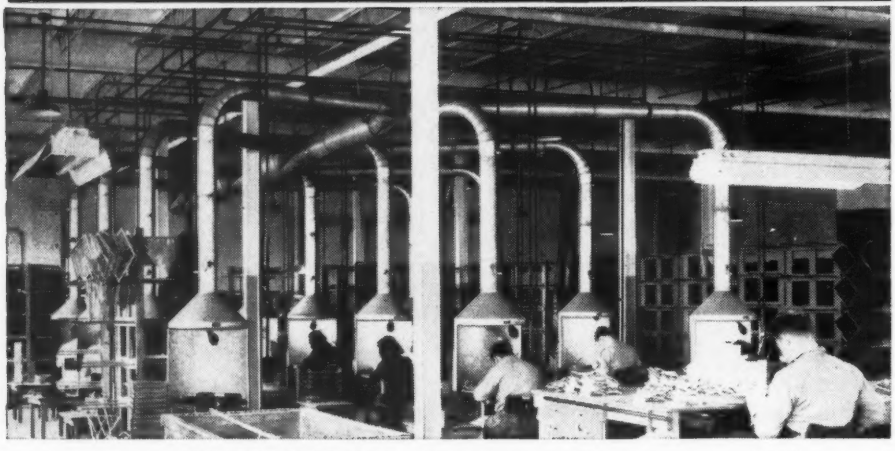

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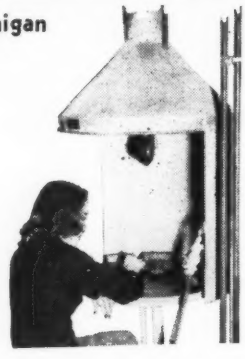

In soldering of picture frame corners, each of more than twelve booths are "conditioned" by the Kirk & Blum System. Typical installations are shown in the new booklet, "Dust Collection Systems in Metal Industries." Write for it today.

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Personals

Soon after Mr. Erikson had been appointed sales manager in 1927 he took up the complex task of making a then unknown phosphate product, Calgon, broadly applicable in water-conditioning where control of water hardness is necessary to permit soap and other detergents to work properly. Calgon Metal Cleaner No. 21 and Calgon Emulsion Cleaner are recent results of this pioneering activity.

OBITUARIES

✝ **John Neufeld,** one of the pioneers of the plating industry in New York, passed away on Saturday, June 26, 77 years of age. The founder and proprietor of John Neufeld Electroplating Works at 890 Bedford Avenue, Brooklyn, N. Y., which has been continuous operation for fifty-one years. Neufeld was universally respected for his ability and integrity and liked by everyone who knew him. He left two sons, Charles and Frank, who are carrying on the business, a son John, and two daughters, Mrs. Margaret Wegeman of Wyand, Long Island, and Mrs. Regina Dannenhoffer of Brooklyn.

✝**Aldus C. Higgins,** 75, for nearly a half century closely identified with Norton Company, the largest industry in Worcester, Mass., and long active in the city's cultural, philanthropic and educational life, died September 10 in his home. At the time of his death, he was Chairman of the Norton Company Executive Committee. His first Norton employment was as patent counsel, on July 1, 1900. He had served in many Norton executive positions including that of president, general manager, and chairman of the board of directors.

Higgins was born in Worcester, December 7, 1872, son of Milton Prince Higgins, one of the founders of Norton Company, and Katherine Elizabeth (Chapin) Higgins. He was educated in Worcester and received a bachelor of science degree from Worcester Polytechnic Institute in 1893 and an honorary doctorate in engineering from W. P. I. in 1931. He invented the water-cooled electric furnace which made possible the commercial production of Alundum abrasive and was awarded the John Scott Medal in 1913 by Franklin Institute for this outstanding work.

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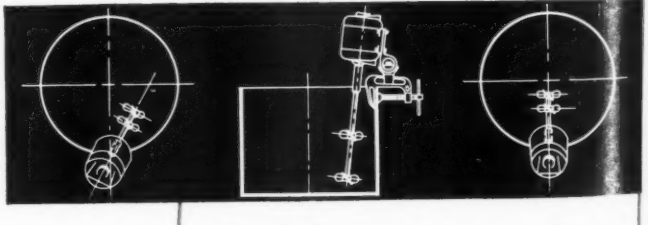

Left illustration shows the proper position for Mixing Shaft to give thorough mix without drawing air into the liquid.

Center illustration shows the normal position of shaft for general mixing.

Right illustration shows shaft in vortex position for drawing light powders, etc., into liquid.

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Editorial

November 1948

JOB PLATING SHOP TROUBLES

THE JOB PLATING SHOPS of the country are much more important to industry than might be expected from the fact that they handle less than one-quarter of all electroplating. On one hand, they represent the plating industry among the big bulk manufacturers who do not have plating departments of their own and the quality of their output is generally taken as a measure of that of the industry. On the other hand, they have often served as the testing ground for new ideas and processes. A healthy condition among the job plating shops, therefore, is the concern not only of the job shop owners but of the plating industry as a whole.

From time to time we have reported in the Industry News Section the rate of operation among Metropolitan New York job shops, an index which in September, 1948 stood at 52.8 per cent as compared to 55 per cent in September, 1947 and 80.5 per cent in September, 1946. But this drop does not tell the whole story. Many marginal shops that were started during the war have gone to the wall, not only in the New York area but in all metropolitan areas throughout the country. This may in itself be considered a natural adjustment. More serious is the fact that with costs of labor, supplies and general overhead at their peak, prices for plating are on the down grade and profits are slowly disappearing in many areas. In fact, many firms are reported to be operating in the red.

The danger in such a situation is that quality is likely to suffer. The National Association of Metal Finishers has tried to forestall such a development by bringing out a manual for use by its members, setting forth all kinds of pertinent technical and cost information, and journals like PLATING have published articles on costs with the same end in mind.

It is to be hoped that squeezed job shop operators will remember that reduction of quality very quickly will ruin any business beyond repair and react to the lasting detriment of the whole industry. Similarly, the job shop customer who does the squeezing will find after a while that his products have suffered and that he has reduced the number of reliable suppliers of quality plating. Our whole economic system is built around reasonable profits. He who denies them to his fellow businessman invites totalitarian measures just as much as he who takes unreasonable profits out of the country's economy.

Gustaf Soderberg

SURFACE FINISHING OF STAINLESS STEELS

K. M. HUSTON

Senior Research Engineer, Armco Research Laboratories,
Armco Steel Corporation, Baltimore, Maryland

THE SURFACE of stainless steels presents a unique phenomenon in that it is normally corrosion resistant to a wide variety of corrosive environments. This property has been attributed by some to the presence of a thin transparent film of oxides which serves to retard corrosive action. Since this film reappears after it has been stripped off or penetrated, it fortifies the entire body of metal against attack by destructive agents. Thus, in effect, the stainless steels, inexpensive by comparison, serve as noble metals in industry and for domestic use.

The terms "rustless" and "stainless" have been used in connection with this useful group of chromium and chromium-nickel alloys, although in some cases they may develop superficial rust and will stain under certain conditions. This behavior is often governed by finishing methods: in some cases an improper finishing procedure will produce an article which will show rust in a short time.

This paper has been written to provide metal finishers with a brief outline of procedures for the application of a proper finish.

One of the first steps in applying any finish is to know what is being finished. Obviously, different methods must be employed for preparing the surface of copper, steel or zinc before electroplating. The same is true of stainless steels.

Grades

There are more than twenty standard grades and many more special grades of stainless steel. Each grade has a specific use, and each may present an individual problem in finishing.

The common grades are classified as (1) martensitic, or hardenable chromium grades, (2) ferritic, or non-hardenable chromium grades, and (3) austenitic, or non-hardenable chromium-nickel grades. The AISI type numbers and their normal analyses are shown in Table I.

Mill Finishes

Stainless steels can be obtained with a variety of finishes.

The common finishes applied to bar, wire and sheet stock are shown in Table II.

Passivation

One more factor, passivation, should be discussed generally before proceeding with the individual finishes. It may sometimes be required after final finishing operations, such as scale removal by tumbling, polishing, pickling, grinding, sandblasting or any other operation which tends to contaminate the surface.

The prime function of the nitric acid passivation treatment is to clean the stainless chemically and without harm. The removal of iron particles imbedded in the surface during fabrication is of particular importance. Of less importance is the possible reinforcement of the oxide film associated with passivity because a properly cleaned stainless steel surface rapidly becomes passive in air and in many other oxidizing environments.

Theories as to the nature of passivity are by no means in accord, and to date no theory has been conclusively supported by proof.

Group I grades may be passivated for 15 to 30 minutes in an 18 to 22 per cent by weight solution of nitric acid to which has been added 1½ to 2½ per cent sodium bichromate, at 110° to 120° F. The addition of the dichromate prevents flash attack which will result in a dull gray appearance on the surface.

A 15- to 30-minute treatment in 20 to 40 per cent by weight solution of nitric acid at 120° to 140° F is suggested for passivating the Group II and Group III grades.

The 20 per cent solution at 120° F should also be used for highly polished parts.

Naturally, the parts should be rinsed thoroughly with cold water after the passivation treatment.

kenneth m. huston, B.S. Ch.E. from Rose Polytechnic Institute, before joining Armco was Finishing Engineer, Western Electric Company, and Assistant to the Technical Director, Chemical Warfare Service, Edgewood Arsenal. He served as President of American Electroplaters' Society, 1947-1948.

Scale Removal

The type of finish resulting from scale removal is one of the first to be considered by the finisher. Scale on stainless steel as the result of heating during or subsequent to fabrication or forging must be removed to obtain satisfactory corrosion resistance.

Thorough scale removal is essential since small traces of scale left in crevices or threads, etc., will tend to produce rust in a comparatively short time and detract from the appearance of the surface.

The scale formed on stainless steels is generally tenacious and may be somewhat more difficult to remove than scale on carbon steel. Two basic methods are used: mechanical methods such as sandblasting and tumbling, or chemical methods such as pickling in acid solutions or in molten salts.

Blasting. It often is practicable and cost-saving to remove the scale on stainless steel parts that have been subjected to high temperatures by blasting. This treatment serves to break up the hard scale and render it more responsive to pickling operations. In certain cases a satisfactory final finish can be obtained by this means, for example on stainless steel castings and forgings. On the whole, however, sand, shot and grit blasting may be considered as merely preliminary steps in the finishing process. Sandblasting is a specific for straight-chromium grades which have been full annealed; the scale that usually develops on these alloys because of the high annealing temperatures and long annealing cycles can only be broken up by sandblasting.

Air-driven or rotary-impelled iron-free sand, stainless steel shot or aluminum oxide grit are all used. Ordinary steel shot, turkish emery, natural corundum, and iron-containing sand are undesirable because they are likely to imbed rust-producing iron in the surfaces being processed. Fragments, deburred particles or other fines must kept out of the blasting medium. The operation must be controlled very carefully and, above all, the force of the blasting stream must be kept diffused so that unevenness of surface does not occur to such a degree that it will interfere with any subsequent grinding and polishing.

Blasting is an essential step in many instances but is not usually employed on products made of sheet, strip or tube.

Shot peening or wheel-abrading, a cold-working process used to relieve surface stress in stainless steels, may also be used for scale removal. This process is a modern method for improving the fatigue life of parts that are to be subjected to bending or twisting under conditions in which the maximum stress will develop in the surface. During the bombardment each shot acts as a tiny peen-hammer.

Even if all scale has apparently been removed by blasting, it is necessary to pickle and passivate the parts. Some fabricators are satisfied in some applications with the utilitarian finish and the degree of corrosion resistance thus produced.

The rough surface resulting from blasting lowers the corrosion resistance, even after passivation, but it may be restored by electropolishing.

Tumbling. Tumbling, a far gentler method of removing scale, is generally used on parts that have been stamped, machined or drawn to practically a completed shape.

Wet tumbling procedures are considered effective. A final finish approaching that of a buffed finish may be obtained by the proper selection of abrasive, speed of rotation, and time.

Tumbling may result in surface contamination that will lead to early rusting of parts. Passivation is then required to clean the surface.

An extreme case of surface contamination of tumbled parts is illustrated in Fig. 1. The finish on these samples was produced by tumbling for 16 hours in a 30-inch diameter octagonal barrel.

Pickling. The scale formed on stainless steel during forging, heat treating, welding and other high temperature processing will vary greatly with the grade and heat treating environment. If it is heavy, blasting or shot peening before pickling will prove economical and time-saving because it will remove much of the brittle scale and crack the underlying layers, thus affording a more uniform removal in the pickling baths.

Chromium grades of Group I and II are the more difficult to pickle. Full annealing of these alloys causes a very tight scale to develop that usually requires blasting to break. Sandblasting should always be followed by pickling to remove mill scale or particles of iron imbedded in the surface.

One recommended procedure for pickling consists of two steps: scale softening and partial removal in sulfuric or hydrochloric acid, followed by final scale removal and whitening in a nitric-hydrofluoric acid solution.

The first step employs 8 to 11 per cent sulfuric acid at 150° to 160° F in a wood, ceramic or lead lined tank for 10 to 45 minutes or a 10 to 15 per cent solution of hydrochloric acid at 120° to 140° F in a wood or rubber lined tank for 30 to 90 minutes. A suitable inhibitor should be used, and the parts should be rinsed thoroughly before they are advanced to the second step.

The second step consists of immersion in a solution of 6 to 10 per cent by volume of nitric acid containing 1½ per cent by volume of hydrofluoric acid at room temperature for 10 to 30 minutes, or until the smut has been removed. The time required for the Group III grades (except the free-machining 18–8 grade, Type 303) may be shortened by the use of a 10 per cent by volume solution of nitric acid to which has been added 1½ per cent by volume hydrofluoric acid at 140° to 160° F until the smut has been removed. This latter method should not be used on Group I and Group II grades nor on the free-machining 18–8 grade.

If these pickling operations have been properly performed and the acid thoroughly rinsed from the part, passivation will take place on contact with air.

The high carbon grades (Types 420, 440A, 440B and 440C) should never be acid pickled in the fully hardened condition. Stress relieving at 300° to 700° F for 1 to 2 hours after hardening and before pickling is essential to avoid pickling cracks.

These grades also require careful watching during the pickling operation to prevent severe etching. If

TABLE I. GRADES OF STAINLESS STEELS BY GROUPS

AISI Type	Normal Analyses			
	C	Cr	Ni	Other Elements
	Group I. Hardenable Magnetic Chromium Alloys (Martensitic)			
403	.15 max.	11.5–13.0	.....	Turbine quality
405	.08 max.	11.5–13.5	.....	Al 0.1–0.3
406	.15 max.	12–14	.....	Al 3.5–4.5
410	.15 max.	11.5–13.5	.....	
414	.15 max.	11.5–13.5	1.25–2.5	
416	.15 max.	12–14	.....	P, S, Se min. 0.07
420	over .15	12–14	.....	
431	.20 max.	15–17	1.25–2.50	
440A	.60–.75	16–18	.....	Mo 0.75 max.
440C	.95–1.20	16–18	.....	Mo 0.75 max.
	Group II. Non-Hardenable Magnetic Chromium Alloys (Ferritic)			
430	.12 max.	14–18	.....	
430F	.12 max.	14–18	.....	P, S, Se 0.07 min.
446	.35 max.	23–27	.....	N_2 0.25 max.
	Group III. Non-Hardenable Non-Magnetic Chromium Nickel Alloys (Austenitic)			
301	.08–.20	16–18	6–8	
302	.08–.20	17–19	8–10	
303	.15 max.	17–19	8–10	P, S, Se 0.07 min.
304	.08 max.	18–20	8–11	
305	.12 max.	17–19	10–13	
308	.08 max.	19–21	10–12	
309	.20 max.	22–24	12–15	
310	.25 max.	24–26	19–22	
316	.10 max.	16–18	10–14	Mo 2–3
317	.10 max.	18–20	11–14	Mo 3–4
321	.08 max.	17–19	8–11	Ti 5 x C min.
347	.08 max.	17–19	9–12	Cb 10 x C min.

the scale has not been removed at the end of 2 or 3 minutes, polishing with a loose buff or sandblasting will be required. These operations, too, should be followed by a passivating treatment.

Molten Salt Treatment. The molten sodium hydride bath acid treatment for scale removal is widely used commercially. In this process, developed and patented by the du Pont Company[1], the reduction of the scale is accomplished by immersion of the work in a molten sodium hydroxide bath containing 1½ to 2 per cent of sodium hydride. The scale is reduced in about 15 minutes after the work has reached the operating temperature of 750° F. The work is then removed, quenched in water, given a brief dip in a 20 per cent by volume sulfuric acid solution and then brightened in a 6 to 8 per cent by volume nitric acid solution or a 10 per cent nitric-2 per cent hydrofluoric acid solution.

Although this process has been used primarily in large scale continuous units, intermittent use for smaller batch-type operations is practicable.

Another molten salt bath used successfully for scale treatment is the Virgo bath containing sodium hydroxide and oxidizing salts. This process is offered by the Hooker Electrochemical Company[2].

Both methods are especially suited for pickling stainless steel because the molten caustic does not attack the metal in any way.

Wire Brushing. Scale should not be removed with a wire brush unless it is made of stainless steel wire. Particles of steel from a carbon steel brush will imbed themselves in the stainless steel and show rust in a very short time. Pickling after wire brushing is not very effective in removing imbedded particles. Stainless steel wire brushes are commercially available although not generally stocked.

Commercial grinding compounds free from iron are probably more economical to use than stainless steel wire brushes.

Cleaning

In general, the methods employed in cleaning ordinary steel may be used for stainless steels.

Mineral and vegetable oils, paraffin, tallow or straw oil may be removed in suitable proprietary detergents, in hot solutions of trisodium phosphate, sodium silicate, sodium aluminate or sodium borate containing small additions of free alkali, or in organic solvents, such as carbon tetrachloride, trichlorethylene, perchlorethylene, kerosene or gasoline.

Surface dust and grease accumulations may be removed with soap and water and a soft cloth. Care should be taken in cleaning highly polished surfaces to prevent scratching from a harsh cloth or adhering abrasives. A 2 per cent solution of sulfonated soap is effective in removing surface dust, grease or fingerprints.

Metallic lubricants such as copper, lead or cadmium, applied to stainless steel wire for cold heading,

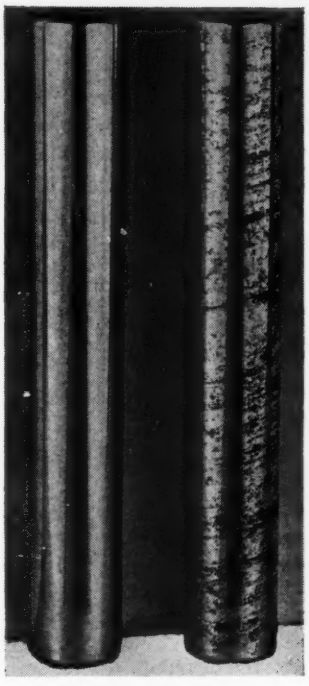


Fig. 1. Effect of passivation on appearance of stainless steel part with badly contaminated surfaces after 32 hours at 122° F and 100 per cent relative humidity. Sample on right, not passivated; on left, passivated prior to test

TABLE II. MILL FINISHES FOR STAINLESS STEEL

Finish No.	Description
	Bar and Wire Stock
...	Hot Rolled (Scale Present)
...	Hot Rolled and Pickled (Scale Removed)
...	Rough Turned (Round Bars Only)
...	Cold Drawn
...	Centerless Ground (Round Bars Only)
...	Polished (Round Bars Only)
	Sheet Stock
1	Hot Rolled, Annealed and Pickled (White Pickled Finish)
2B	Bright Full Finish (Smooth, Bright, Cold Rolled Finish)
2D	Dull Full Finish (Smooth, Dull, Cold Rolled Finish)
4	Standard Polish (Bright Finish with Fine Polishing Lines)
6	Standard Polish, Tampico Finish (Soft Luster, Satin Finish)
7	High Luster Polish (Glossy, Bright, Buffed Finish)

wire drawing or spring winding, are easily removed by immersion in a warm solution of 20 per cent by volume of nitric acid. This solution is also effective in removing lime and lime base mixtures used in tumbling and burnishing operations.

Stainless steel wool, with or without pumice, or household cleanser may be used on the duller finishes—for example, 2B, 2D or pickled surfaces. Ordinary steel wool must not be employed for the same reason that ordinary steel wire wheels must be avoided. Small parts may be cleaned with a plater's scrub brush and powdered pumice.

Weld stains and rusted areas may be removed from surfaces too large to passivate in tanks by swabbing with rags wet with 50 per cent hydrochloric or 10 per cent nitric acid. Although the hydrochloric acid will clean more quickly, the nitric acid solution is generally preferred because it will not etch the surface.

Thorough rinsing with water and prompt drying are essential to preserve the cleaned finish.

Protection of Finish

When stainless steel stock has been purchased from the mill in a highly finished condition, it is frequently advisable to protect the finish while the sheet, strip, bar and, in some instances, wire are being fabricated. Paper sheet and tape as well as transparent plastic lacquers have been found practicable. When the construction or fabrication has been done, these materials can be readily removed with warm water or solvents. The synthetic coatings likewise may be readily removed with a solvent, such as acetone. A lithopone-linseed oil lubricant has been used for finish protection during forming and drawing operations; it may be dissolved in a kerosene bath upon the completion of the operation.

Grinding, Polishing and Buffing

The same equipment used in grinding, polishing and buffing ordinary steel may be used for stainless steel. Generally, speeds of 6,000 to 8,000 surface feet per minute are recommended for grinding and polishing and speeds not over 10,000 surface feet per minute for buffing.

Stainless steels are easily overheated during grinding, polishing or buffing because of their low thermal conductivity and high abrasive resistance. The operator should not try to overcome the latter by too much pressure on the wheel; the light gages of Group II may be distorted and the Groups I and II grades may gall or score.

Methods of obtaining the various finishes on sheets are described on page 165 of the February issue of Plating. The metal finisher who wants to produce consistently a quality finish will observe these "dos" and "don'ts":

Use only stainless steel coloring rouge (green chromic oxide or unfused aluminum oxide) for a mirror finish.

Use only fused aluminum oxide abrasive grain or silicon carbide grain for grinding or polishing.

Do not clean or polish stainless steel with red rouge, an iron oxide-wax mixture used in polishing other metals.

Do not apply rose tripoli, a soft silica containing some iron oxide.

Do not use turkish emery, a dark natural form of aluminum oxide also known as corundum, which contains a considerable quantity of iron oxide, for final finishing operations.

Electropolishing*

Electropolishing is the reverse of electroplating in that the finish is obtained by electrolytically removing metal from the surface instead of depositing it. It has found wide application on many products, such as refrigerator shelves, sink strainers, bobbin boards and stove grilles, which by their very nature would be very costly to polish by mechanical means.

While there are solutions for electropolishing most base metals, the ones for polishing stainless steel have found greatest commercial application. Of these, the glycolic-sulfuric acid[3], citric-sulfuric acid[3] and phosphoric acid-butyl alcohol[4] baths are believed to be most generally used.

These baths are quite like chromium plating baths in their operating characteristics, with similar current densities, racking methods and throwing power. The essential difference is that the work is the anode in the electropolishing bath.

A current density of 1 ampere per square inch will remove approximately 0.0005 to 0.0007 inch per surface in ten minutes, which is generally sufficient to give a good polish.

These solutions are non-toxic, non-explosive and easy to control. They have long life and require relatively low current densities. The citric-sulfuric and glycolic-sulfuric acid baths operate at 180° to 200° F and are of the sludging type. They are generally operated in lead lined, ceramic lined, or acid-proof brick tanks. Drag-out losses are minimized by the use of a reclaim rinse after electropolishing.

The phosphoric acid-butyl alcohol bath is kept in a stainless steel tank and is run at a lower temperature.

The degree of smoothness resulting from electropolishing depends upon the smoothness of the original surface. A product may require some preliminary mechanical work to remove grinding marks or deep scratches, although in any case a bright finish will be produced by electropolishing even on rough surfaces. The required amount of mechanical work varies greatly with the design of the individual part and the

(*Continued on page 1142*)

*See also C. H. Faust, "Electropolishing—What Is Its Status Today?" Proc. Am. Electroplaters' Soc. 33, 49–74 (1946), and J. Mazia, "Electrolytic Polishing Theory and Practice". Monthly Rev. Am. Electroplaters' Soc. 34, 937–944 (1947).—Editor.

Electroplating Hazards and Nuisances

R. W. OYLER

Plating Engineer, Guide Lamp Division,
General Motors Corporation, Anderson, Ind.

Introduction

Like most chemical industries, the plating industry has difficulties with a variety of hazards and nuisances, both inside the plants and without.

Those which occur on the inside may affect the health and efficiency of the workman and, in localities where little attention has been paid to them, may make it hard to recruit the best kind of help. Excellent articles on certain phases of this portion of the subject have appeared in THE MONTHLY REVIEW[1,2,3,4] and in PLATING[5,6].

Difficulties which result outside the plating plant are the subject of a timely study[7,8] by A. E. S. Research Project No. 10 on "Disposal of Plating Room Wastes".

It is the purpose of this paper to recount some recent experiences in the field and to draw attention to some simple remedies.

In general, the difficulties we propose to discuss fall into five groups:

1. Gross-contact injuries such as chemical and thermal burns, mechanical injuries, etc.
2. Poisoning
3. Injuries to the nose, throat, and lungs in particular and to all body surfaces in general, caused by air-dispersed materials
4. Harmless but unpleasant odors which undermine employee morale and efficiency
5. Stream pollution and damage to wild life or city sewage treatment systems by plating room wastes

Although this grouping does not cover all problems which, conceivably, must be considered by electroplaters, it will, perhaps, serve to focus attention upon a number which are encountered almost daily.

Gross-Contact Injuries

Recently an operator, in direct violation of safety rules, and in the course of putting cathodes on the back rail of an anodic cleaner in a double-file plating conveyor, was standing with one foot on the front edge of the tank and the other upon the center cathode rail; his foot slipped off the cathode rail, and one leg went down into the hot cleaner. Instead of plunging his leg into a rinse tank and removing his shoe and sock, the operator thought only of getting to the nearest plant hospital. Upon his arrival it was found that the solution retained in his shoe and in his sock had caused painful burns. Although the desire of the worker to obtain proper medical attention was most natural and commendable, the lessons to be learned from this incident are quite apparent. It is the responsibility of the supervisory personnel to see not only that proper safety equipment is provided but also that it is used. Safety boards ahould always be placed across a tank.

As one step in our general safety program, we have stencilled in large letters on the side of each plating, acid, and cleaner tank the type of solution contained and the temperature. We believe that this information would be of some assistance to those performing first aid, should the necessity arise.

Where tanks are not set down into the floor, a catwalk is often constructed along the tanks to aid the operators in putting anodes into the bath and to do general work around the solution, particularly in large automatic conveyors. All too frequently the distance of the walk below the edge of the tank is too short; should the operator become overbalanced by an anode, the flange on the tank rim would act as a fulcrum on the shin bone and thereby actually facilitate a potentially fatal plunge.

Other causes of injury need only be listed; the remedies are evident: dermatitis from gloves soaked with plating or related solutions; burns from contact with hot pipes, racks, tanks, etc.; broken bones and bruises from slipping on slick and untidy floors and from dropping of anodes, containers, etc.

Poisons

In considering poisons or, to be more specific (and with a bow to our medical friends), protoplasmic intoxicants, most platers think first of cyanides or, more particularly, of hydrocyanic acid. Although one should not minimize the very real dangers inherent in the use of large quantities of various cyanides close to acids, one must deplore the rather loose, "bogeyman" references to cyanides sometimes found in the literature.

Here again, operator education is essential. On one hand we have attempted to emphasize the necessity for care in handling of cyanides by sending the daily additions to the plating departments in distinctively colored and labeled containers which are used for cyanides only and by making it clear to all concerned that these additions should not be left standing around for any length of time before they are added to the tanks. On the other hand, we have attempted to explain carefully to our tank men that, under certain conditions, an acid can be added to cyanide plating solutions without reducing the plant population.

Before the late war, we had a Rochelle copper bath which we used to plate bumper guards. Whenever we found that the Rochelle salt concentration was low and the carbonate concentration high, it was our practice to correct these deficiencies, at least partially, by adding tartaric acid. We explained to the operators that carbonic acid would be formed rather than hydrocyanic acid. In establishing the fact that hydrocyanic acid would not necessarily result whenever a quantity of acid was carried past a cyanide plating bath, we did not make light of the precautionary measures to be taken with cyanides.

Mention should also be made of copper, cadmium, zinc and oxalic acid as poisons.

Unpleasant but Harmless Odors

Difficulties encountered with unpleasant but actually harmless odors usually depend upon the attitude of the employees which, in turn, is related to the past record of the plating departments in maintaining fume-free conditions. If workers are constantly bombarded by a succession of new odors, their natural human fear of the unknown will assert itself; they will suspect the worst regardless of the true situation. On the other hand, if the employees are convinced that management is maintaining reasonably pure air for them, a strange smell now and then will probably cause little more than passing comment.

Among the plating materials which give rise to odors that are essentially harmless in existing concentrations are sodium polysulfide (used for stripping copper from steel), sodium nitrate electrolytic strips with their ammonia odor, and various emulsion type cleaners which smell of pine oil or kerosene or both. Odor from the latter will be much more pronounced if the cleaners are sprayed or used in vigorously agitated soak tanks.

If employees do complain, the prompt installation of an efficient exhaust system usually pays dividends. A do-nothing policy may well cost more in the long run because the operators will probably punctuate their working time with frequent and lengthy sessions of "griping" and loud calls upon the Unholy One to give extra attention to their employer. A no less important reason for such installation is to avoid excessive labor turnover, a really expensive thing.

Injurious Air-Dispersed Materials

It is unfortunately true that too many discussions of what to do about preventing dissemination of air-dispersed materials have been conducted with a bored "everyone in favor of exhaust systems, say 'Aye'" attitude. Much lip-service has been paid to the exhaustion of plating tanks with a regrettable lack of study of the principles involved or the real requirements of the situation.

Whether or not a manufacturer feels any obligation to maintain clean air in his plants, the day is definitely at hand when he will be required by law to do so. Recently the writer served as a member of a committee to formulate for the Commissioner of Labor of the State of Indiana a code to regulate certain phases of safety and industrial hygiene in the electroplating industry of the State. Authority for the adoption of such a code had already been granted by the State Legislature. Although this code is by no means being held up as a model for other states to follow, it is mentioned to show that means exist for legal action—with accompanying penalties—against employers who have been reluctant to recognize their obligations to provide a healthful place to work.

The possession of proper air sampling equipment and the availability of competent, trained technicians for analytical work are definitely not luxuries; they are necessities.

In designing adequate ventilation systems, certain considerations must be given to the seasons of the year. By this is meant that a tank exhaust system which apparently functions successfully in the summer may be a miserable failure in winter. The obvious point is that in warmer weather the doors and windows of the plant will probably be open, while in the winter everything will be tightly shut, causing exhaust systems to operate against each other.

To turn to specific problems, it is not always recognized that the effect of alkaline spray upon a person resembles that of chromic acid spray except that the action tends to be somewhat more shallow. Thus certain cleaning operations may require stronger ventilation than some chromium plating tanks.

The mist arising from copper strike tanks, particularly long ones, must also be regarded in its proper light. In sufficient quantities it can and does cause severe nausea. An actual case came to the attention of the writer about a year ago. It was the practice in one plant to recirculate the solution in a long cop-

per strike and spray it through a perforated pipe which was mounted just above the plating solution at the exit end of the tank to provide a clean surface through which the work would be transferred to the next tank. One day when it was necessary to repair the pump, air was substituted to do the skimming. Unfortunately that very day a man had occasion to spend several hours on a cat-walk along the conveyor and on the down-wind side of the strike. After a period of sneezing and noting increasing nasal congestion, he returned to his home at night only to become severely nauseated. This condition, accompanied by extreme weakness, lasted for the next day or two. This incident illustrates that even a carefully designed exhaust system cannot compete with strong cross currents of air which tend to direct the mist and fumes away from the system. Systems have been used successfully which incorporate an exhaust on one side of a tank and a blower on the other; it is almost needless to point out that design calculations must be made with great care.

Injurious mists may also arise from copper sulfate plating solutions if used with vigorous air agitation, cyanide zinc plating solutions, and electrolytic acid tanks in general.

Plating Room Wastes

A review of the literature shows a surprising amount of work in the field of waste treatment and disposal in past years; one engineer in doing some research on this subject catalogued not less than 2,300 articles of varying lengths and coverage. Why, then, does the subject of industrial waste control seem to be so new to so many? In our opinion it is because industry in general had been permitted to be careless for such a long time; until comparatively recent years, waste disposal was synonymous with indiscriminate dumping and running the waste materials down the sewers or into streams.

A case in point recently came to light in Michigan. The State Department of Health received word that the water from some of the wells in a village had turned yellow and, upon analysis, established the fact that the coloring was due to the presence of 10.8 ppm of chromate. The source of the contamination was not difficult to locate. About three years before, a plating plant had been established in the town and was discharging its chromium and cyanide wastes into a pond from which they seeped and finally disappeared, entirely below the ground surface. The affected wells of the village were located approximately 1,000 feet from the waste pond. It took, therefore, about three years for the chromate to pass horizontally through the 1,000 feet of sand to the wells. It was also interesting—and appalling—to note that should pollution of the ground structure have ceased at the time of discovery, it could be prophesied that the water from the affected wells would not be free of chemical pollution for at least six years and perhaps much longer.

This story, part of an article which appeared in the *Michigan Water Works News* of July, 1947, is well worth reading in its entirety.

Aside from endangering the public water supply, uncontrolled waste disposal can be a real menace to domestic animals which drink from streams, to fish, and to the bacteria necessary for the functioning of sewage treatment plants. It has been stated authoritatively that from 0.5 to 2.0 ppm of cyanide are toxic to fish. Anyone who thinks that the Isaac Walton League and other conservation groups will sit idly by and permit the streams to become unduly polluted is due for a rude shock.

Another item which sometimes escapes notice is the quantity of insolubles in suspension in industrial waste. These, when present in large quantities, settle out on the stream beds and so cover up much of the marine life which the fish use for food.

In passing, it is suggested that those who are interested in industrial waste control and who do not have a copy of the Industrial Waste Supplement to the City of Detroit Sanitary Code should take steps to secure a copy. It is likely that it will serve as one of the national models for similar codes in other cities.

One of the first things that should be considered by any plant contemplating the installation of sewage treatment equipment is the reduction within the plant of the quantity of waste to be treated. Even a fairly superficial study will reveal the advisability of using such simple, but too often totally ignored, devices as reclaim tanks and automatic solution level controllers. The use of reclaim tanks not only reduces the spreading of chemical contamination to subsequent overflowing rinses (and thence to the sewers) but also represents an application of practical economics. Considerable money and grief can be saved by placing reclaim tanks immediately following high-concentration copper cyanide, chromium, and bright nickel plating solutions.

Careful consideration should also be given to the selection of proper packing for heat exchangers and filter pumps. Considerable sewage contamination and loss of valuable plating chemicals can result from leaky pumps and filters. Of course, the tanks themselves should be constantly checked for leaks. In this connection, the use, where practicable, of trenches surrounding chromic acid and cyanide tanks and leading to a retaining sump has been recommended.

Most industrial waste codes specify that over a given period of time, industrial waste waters shall have an average *p*H of 7; the codes also commonly permit a temporary variation of *p*H of from 5.0 to 10.0. One simple method of keeping within these bounds is to dump cleaners and acids at the same time.

While the problem of disposal of plating room wastes in plants having very large plating installations may reach almost insurmountable proportions in extreme cases, it is seldom necessary to treat ordinary rinse waters in such plants since the tremendous dilu-

tion and tendency for different wastes to neutralize each other automatically result in a relatively neutral and harmless effluent.

The literature contains mention of several methods of destroying *waste chromic acid solutions*. Perhaps the three most common are (a) reduction to the trivalent form and subsequently precipitation as chromic hydroxide with ferrous sulfate and lime, (b) precipitation as an insoluble chromate by addition of barium carbonate, and (c) adsorption by ion-exchange materials, which, however, are often difficult to regenerate and if regenerated again release chromates. None of these nor any other means known to the writer provides a cheap, simple, and practical method of destroying chromate waste in quantity. Proper dilution, therefore, seems the only reasonable solution to the problem.

Close cooperation with the local municipal sewage treatment plant is strongly recommended when it is desired to dispose of chromium solutions; while some biochemical plants are unharmed by surprisingly large quantities of chromic acid, activated sludge plants are ruined by very small amounts.

About two years ago we had occasion to dispose of considerable quantity of chromium plating solution because of its high iron content. We have since taken steps to prevent a repetition of such a necessity, but at the time we were faced with a major problem in disposal. By working with the sewage treatment works, we found that by syphoning the solution into the sewers through a 1/8-inch tube a not too great concentration would be introduced; in this way, we not only solved our problem but, we believe, also retained the respect and good will of the local authorities.

The treatment of *cyanide wastes* is currently being carried on by a number of different methods. Some plants use chlorine; others add sulfuric acid under rigidly controlled conditions and discharge highly diluted hydrocyanic acid gas through a tall stack into the atmosphere. We, however, are destroying cyanides by electrolysis.

We became interested in this problem in the latter part of 1944 when it became necessary to dispose of the residue in the bottom of a cyanide copper plating tank. Since the solution had been unused during the war years, a quantity of sludge consisting essentially of sodium or potassium carbonate or both had formed and necessarily entrained a considerable amount of plating solution. Included also in the original disposal problem were some entire solutions which had partially evaporated and which because of high carbonate content were not considered suitable for plating. They were accordingly destroyed by the method under discussion.

When faced with this disposal problem, a member of the organization considered that in normal cyanide copper plating, the use of excessive temperatures or insoluble anodes or both resulted in accelerated decomposition of the cyanide; the resultant products were carbonates and ammonia as well as, perhaps, some formates and cyanates. He concluded that a judicious use of these improper plating conditions might serve to destroy completely the cyanides in question. The practicability of this idea was confirmed by extensive laboratory tests in which a concentrated solution of the cyanide-bearing materials was electrolyzed with insoluble anodes at a high current density and a high temperature. It was found that by this process the cyanide content could be reduced to a negligible amount.

Translation of the laboratory scale activity to a workable set-up involving several thousand gallons was merely a matter of time. At present we are using temperatures as close to boiling as possible, vigorous agitation, high current density, and copper electrodes since most material to be disposed is formed in the barium hydrate treatment of copper plating solutions. The metal is deposited and subsequently used as anodes for plating or sold as scrap. Due to the high carbonate content of the material being electrolyzed, the copper electrodes show no appreciable tendency to dissolve and are not as susceptible to complete polarization as were the heavy, expanded-metal electrodes of steel originally used.

Experience has shown that total cyanide is destroyed at an average rate of about 1 oz/gal/day, the rate being much higher at high concentrations and diminishing as the cyanide content approaches zero. The solution composition is not critical and may range from a very low value to the limit of solubility of the material being destroyed. It is discarded whenever the metal and "free" cyanide contents have reached zero and the total cyanide such a low figure that its subsequent dilution in the sewer renders it unimportant.

Acknowledgment

Grateful acknowledgment is made of the assistance rendered by Mr. R. M. Wagner and Dr. W. L. Baughn of Guide Lamp Division, General Motors Corporation, in the preparation of this paper.

REFERENCES CITED

[1] R. P. Warren, "The Selection and Maintenance of Air Handling Equipment", Mo. Rev. Am. Electroplaters' Soc. 33, 37–43, 95 (1946).

[2] W. Blum, "Health Hazards In Electroplating", ibid. 33, 411–414 (1946).

[3] F. A. Patty, "Environmental Control of Metal Cleaning Processes", ibid. 33, 808–819, 945–953 (1946).

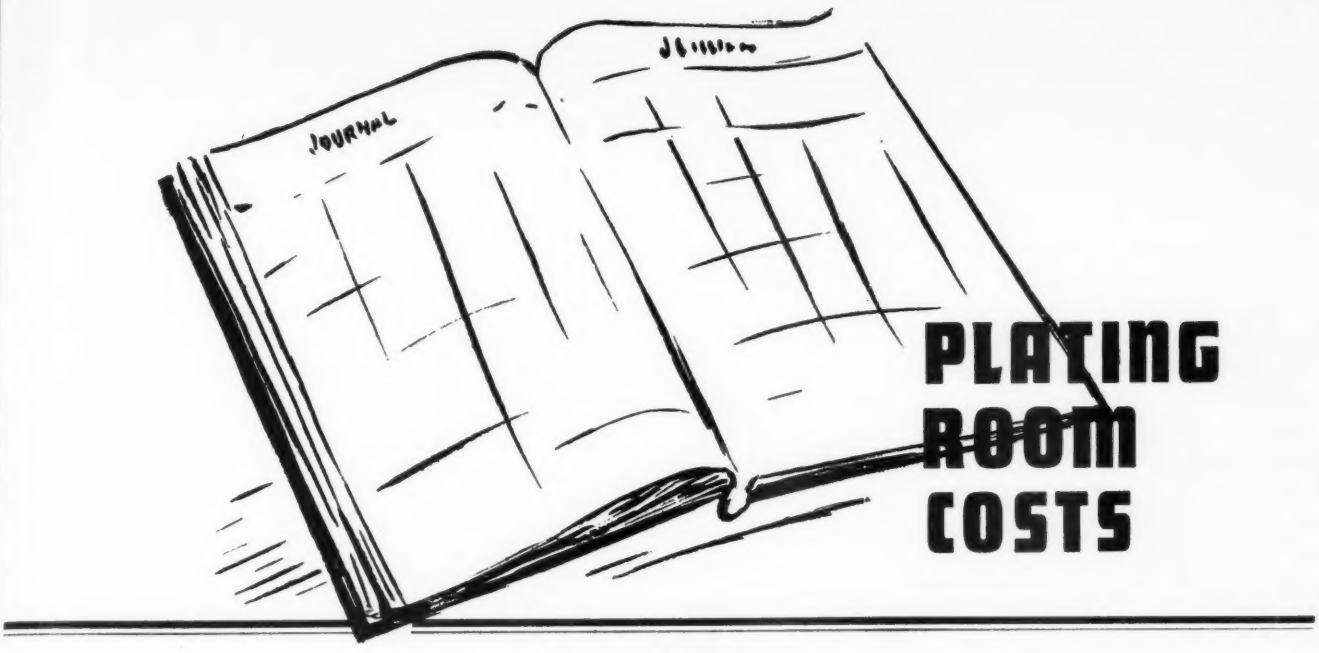
[4] J. C. Soet, "Industrial Housekeeping and Sanitation", ibid. 34, 1251–1261 (1947).

[5] A. C. Stern, L. P. Benjamin and H. Goldberg, "The Use of Plastic Beads in Chromium Plating Tanks", Plating 35, 565-567 (1948).

[6] V. P. John, "Ventilation in the Production Department", ibid. 35, 812–813, 862 (1948).

[7] B. F. Dodge and D. C. Reams, Jr., "The Disposal of Plating Room Wastes". Annual Report on A. E. S. Research Project No. 10. Proc. Am. Electroplaters' Soc. 34, 249–269 (1947).

[8] B. F. Dodge and D. C. Reams, Jr., "Disposal of Plating Room Wastes. I. Bibliography", A. E. S. Research Report No. 9. American Electroplaters' Society, Inc., Jenkintown, Pa., 1948, 32 pp.



PLATING ROOM COSTS

H. E. SNYDER

Assistant Professor of Accounting, School of Commerce, Loyola University, Chicago, Ill.

FAR TOO MANY businessmen consider records a nuisance. Some fail to get full value from their accounting records because they do not completely understand how to use them in determining costs nor the necessity for knowing the costs.

Importance of Costs

One reason for knowing costs is to provide a basis for setting prices. In any business which is not monopolistic and in which competitive bidding for work is a factor, selling prices are limited to a point where it is necessary that costs be known in order both to meet competition and to avoid loss by bidding at selling prices which are below cost.

A second reason is the necessity of setting sales quotas. There is a "break-even" point in every business, a point at which sales income catches up with costs and begins to result in profits. Only analysis and knowledge of costs will enable a business man to find his "break-even" point and to determine the minimum amount of sales he must make to avoid loss.

Cost Elements

Realizing that one must know costs, the next question is what to include as cost. In general we say that it is the expense of production, selling, and administration. To be more specific, the cost of any plated article means the cost of the material used, the cost of the labor directly applied to that article, and a pro rata share of all overhead expenses. The problem, therefore, resolves itself into the question of finding the most expedient method of determining these elements of cost with respect to any one item. No matter what method is used, it must be remembered that the essence of any costkeeping record is that all expenses of a plant are reflected somewhere in the cost of an article produced. If at the end of the year, or of some other accounting period, only 75 per cent of the expenses have been picked up as part of the cost of items produced, then the cost of the individual items are not properly shown in the cost figures.

Cost Systems

It is extremely difficult to discuss plating cost in anything but general terms because some platers deal with plating departments in manufacturing concerns with highly developed accounting systems, some represent large job shops which may keep rather elaborate accounting records, and some come from small jobs shops in which the employer does some of the actual plating and is constantly in touch with the processes and work in the shop although he has a minimum of accounting records. In some of the latter shops the output would not justify the time and expense involved in keeping a complicated accounting system. Any record keeping system, whether it makes use of general accounting records, cost system, payroll records, or some other type of data, should be adapted to the individual business which it serves. Simple records well kept are usually of greater value than more complicated records which are poorly kept.

The term "cost system" is flexible and implies a great number of different types of records and record keeping. There are some cost systems in which the cost of each job is segregated and through a work-in-process account is tied up with the general books of the concern. In that type of system definite prices, costs, and profits on each individual job are obtained.

It is the type of system which would probably be used best by the plating department of a large manufacturing concern or by the large job shop.

There is another type of cost system in which no attempt is made to bring the cost of each individual job into the general books. Usually in this type of system complete costs are not kept on each job. Statistical data, accumulated monthly, quarterly, semi-annually, or annually, are used in computing the average cost of each process. Of course, costs may be estimated for each particular job, but these estimates are not shown in the general accounts. A cost system of this kind is particularly useful in setting prices and, being inexpensive, is probably the method most commonly used in small and medium size job shops. While it does not prove itself by means of the general books, it has been very satisfactory where the owner is in fairly close touch with all of the operations of the business. At the end of each period the accuracy of the figures used in estimating costs during the period is checked by analysis of the general books for statistical data on labor, materials and other items.

Classification of Costs

Any cost system is generally divided into three major classifications: material, labor and overhead. By overhead is meant those items of expense not directly attributable to specific work produced, such as rent, light, insurance, and so forth. Frequently, one speaks of direct and indirect costs. In explanation of those terms I would like to quote the following from W. B. Lawrence's book, "Cost Accounting":

"The classification of direct and indirect cost relates to the manner in which cost is charged to the product manufactured. Any cost which can be identified as having been incurred on account of a particular order can be charged directly to that order. Costs which are incurred as a result of the general operation of the business and not specifically for a particular order are known as indirect costs, because they must be applied to orders in some indirect manner to find the complete cost of the product."

In most industries, material and labor are the direct costs and the overhead consists of the indirect costs. In the small plating job shop materials actually approach the nature of overhead since, in place of being applied directly to the product, they have to be distributed over an indefinite number of products in somewhat the same manner as such overhead items as rent, heat, and so forth. Where highly detailed accounting systems are in use, it may be possible and advisable to distribute materials to individual jobs. Likewise, power, usually used as an overhead item in the small shop, may be determined for specific jobs in the large shop.

It thus becomes evident that allocation between direct and indirect costs may vary depending upon the type of accounting records and available office help.

Development of a Cost System

When any form of cost system is being installed, one of the prime requisites is the *division of the plant into departments*. This is done because the more closely the costs are allocated to the items involved, the more accurate will be the cost figures. Again quoting Mr. Lawrence:

"A department, within the meaning of cost accounting, may be defined as a section of a factory in which are located like machines, or in which like kinds of work or operations are performed, and which incurs expense of an amount or kind which is different from that of other sections, or which has a different person responsible for its management from those responsible for the operation of other sections".

The plant may tentatively be divided into polishing and buffing departments, plating department, spray and lacquer finishing department, inspection and packing department, and others as need requires.

In both the small and large shop, the *books of original entry* should be set up so as *to facilitate the cost-keeping work*. Payrolls can be designed to show the number of hours worked and the wages paid in each department, a distribution which is easily taken care of by means of a daily time card for each employee showing the department in which the work was done and the number of hours worked.

This brings up the problem of direct and indirect labor within a department. If costs are to be based on direct man-hour costs, it is vital that a reasonable basis be found for what constitutes direct man-hours. In a plating department with full automatics, racking time might be considered as direct labor and all other work as indirect labor. The classification will necessarily depend upon the conditions prevailing in the individual shop as to departments, segregation of work, and type of accounting records kept.

Purchase records or cash disbursements records or both can be devised so as to indicate the department to which charges should be made for direct materials or expenses. These direct materials would include such items as polishing supplies, anodes, cleaners, acids, etc. Shipping supplies and expense would be charged directly to the shipping department.

There should also, of course, be sufficient classification so that a detailed listing of overhead items can be readily secured. These overhead items normally consist of such expenses as for rent, taxes, light, gas, fuel, insurance, depreciation of fixed assets, factory supplies, and indirect labor.

The overhead expenses should be apportioned to the various departments upon some reasonable basis. For example, general property taxes and rent as well as some other items, might be distributed on the basis of floor space occupied. If there is any method of distributing these expenses to departments rather than using them as a whole, that method is to be preferred.

The distributions can be made either through classification in the purchase or cash journals or by means of entries in the general journal at the end of each period. For example, if it has been determined to

charge 50 per cent of the rent to the plating department, 30 per cent to the polishing and buffing department, and 10 per cent each to the shipping department and the office, the total rent for the month could be so distributed either on the purchase record or in the cash disbursements book. Similar plans can be followed for light, etc. Undoubtedly a general journal entry would be made at the end of each month, or other accounting period, for such overhead items as depreciation and insurance which can be allocated to specific departments. Other items of overhead would go into general shop overhead, selling expense, or administrative expense.

In the *smaller shops* where labor is the largest factor in the cost of plating, it is advisable to work out the *costs on a man-hour basis*. First is determined the number of man-hours of direct labor worked for the period under consideration—either monthly, quarterly, semi-annually, or annually—by department. Then the various direct and indirect expenses are allocated to the department and added to the cost of the total man-hours worked in the department to determine the overall cost per man-hour. In estimating a job, test runs are made to determine the direct man-hour time which will be used; multiplying that time by the man-hour cost previously determined will give the estimated cost of the job. After the job has been run and the actual man-hours per department ascertained, the actual cost of the job is determined by multiplying the actual man-hours used by the rate per man-hour for each department. If one wishes to carry the testing of the rates one step further, the total cost of all jobs run through the plant for the period, as ascertained on a man-hour cost basis, should approximately equal the total of costs and expenses shown by the general books. When this method of costing is used, power, materials and supplies, administrative and sales expense are all considered a part of the cost to be allocated to the various departments.

In *larger shops* it is advisable to use more detailed methods of costing, and a *job cost system* is advisable. Under this system every job going through the plant is given a job order number. Job order tickets provide for the summation of direct labor cost on the job, expense of current and materials, and plant overhead. Whether administrative and selling expenses are to be shown on the job tickets will depend largely on the use to be made of the tickets and the manner in which they are tied in with the general books. It would not seem advisable to have such items on job tickets for the plating department of a manufacturing plant where the plating cost is only one of the many costs of the product; it might be well to show them on job tickets of a job plating shop where the tickets are to be referred to in estimating future bids on similar jobs.

Data shown on the job tickets are accumulated from various sources. Direct labor is posted from time tickets which should show actual time worked on each job; power consumption is determined from tables which show how it varies with type and thickness of deposit and rate per kilowatt hour; cost of materials can also be obtained from tables based on thickness of deposit, the square feet of surface covered, and the price per pound of the material used. The determination of area may present a problem in a job shop but should not be difficult in a plating department of a manufacturing plant where the same items are plated from day to day. In using the power consumption tables and the material tables, care must be exercised so that the entire power bill and the entire cost of materials incurred during the period be distributed to the job tickets either as direct charges from the tables or as indirect expense for any balance. This balance, of course, should be kept small. All other expenses of the department are charged to the job tickets as a predetermined percentage usually applied to the direct labor costs. The job ticket when completed, therefore, will contain the entire factory costs of the item; in some cases, as previously mentioned, it is advisable to add administrative and selling expenses commonly as a fixed percentage of total factory costs.

If a general cost system is in use, accounts showing labor in process, materials in process, and overhead in process may be set up on the books, the charges to such accounts coming from the inventories and the credits representing cost of sales.

In the plating departments of manufacturing plants, where the items to be plated are standard and there is little variation in quantities from day to day, it is possible to set up *standard costs* for the various items. In the absence of material price changes in cost and expense, these standard costs will absorb very nearly all direct labor, materials and supplies, and plating room overhead. The advantage of the standard cost system is that once established it is easy to operate

Summary

There are certain steps that are essential in setting up any costkeeping system in a plating plant: (1) determination of how best to divide the plant into departments; (2) decision as to which costs are to be charged directly to the departments (or to the jobs if specific job costs are being used); (3) setting up the books of original entry in such a way as to facilitate charging of costs to the departments; (4) provisions for bases for allocation of certain overhead costs to different departments; and (5) choice of method of charging administrative and selling expenses. The exact emphasis and distribution of various items will vary from plant to plant, depending on its size, type of work done, etc. But no matter what method of costing be used, the total of the costs determined for individual items or jobs should be approximately equal to the total costs and expenses for the same period as reflected on the general books of account.

Other articles dealing with cost are: "Sound Cost Control Procedures in the Job Plating Business" by R. J. O'Connor, Monthly Rev. Am. Electroplaters' Soc. **34,** *155–168 (1947), and "Wage Incentives in the Plating Room" by F. K. Savage, Plating* **35,** *236–240 (1948).*

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Maurice R. Caldwell

MAURICE R. (MAURIE) CALDWELL, Assistant Vice-President and Chief Technician of the Jarvis Division of Doehler-Jarvis Corporation, Grand Rapids, Mich., was born in Lapier County of the same state on June 2, 1907. He attended Imlay City High School and then went to Michigan State College in East Lansing, from which he graduated in 1928 with a Bachelor of Science degree, havng majored in electrochemistry under Professor D. T. Ewing.

Mr. Caldwell began his industrial career in the laboratory of Dodge Brothers Division of Chrysler Corporation. Having gained valuable experience shifting from one kind of analytical work to another, including analysis of ferrous and nonferrous metals and plating solutions, he was in 1930 made chemist and trouble shooter in the plating department where chromium plating had introduced new problems in the plating of copper and nickel. These he dealt with successfully until 1933, when he joined the Yale & Towne Manufacturing Company to organize and operate the plating department of a branch plant about to be set up in Detroit.

The following winter, in 1934, Mr. Caldwell accepted a position with W. B. Jarvis Company of Grand Rapids as Chief Chemist. Here his responsibilities have included the operation of the plating department and the production of finishes which meet the rigid customer specifications, especially those of automobile manufacturers. His success is demonstrated by his contribution to the development of zinc die cast plating, a field within which he is a recognized authority, and by his advancements within the company during the years that have followed.

Mr. Caldwell is a member of a number of technical societies, among them American Society for Metals, American Society for Testing Materials and its Committee B-8 on Electrodeposited Metallic Coatings, Electrochemical Society, and American Electroplaters' Society. He has been particularly active in the latter for a number of years, as President of its Grand Rapids Branch, as a Society officer, and as a member of its Research Committee. His five years' service on the Society's Executive Board was climaxed with the presidency in 1944–1945. As an A. E. S. Research Committee member he served as Chairman of its Finance Sub-Committee, perhaps the most exacting assignment within the Society. Recently he has received the appointment to serve as A. E. S. Liaison Member on A. S. T. M. Committee B-8 to assist in the coordination of the activities of the two organizations, especially those pertaining to specifications.

With his many responsibilities, Mr. Caldwell has had little time for extracurricular activities. Besides bringing up a family with two girls and a boy he does some golfing and fishing but does not claim any great proficiency in either art.

An Early Course in Electroplating

GEORGE B. HOGABOOM, *Consultant*

New Britain, Connecticut

THE CONTENTS of "A. E. S. Manual for Electroplaters' Science Course" published in the September PLATING is an outstanding proof, if one were needed, of the high standing of the science of electroplating. It was not always so.

Probably the first course in electroplating was started in Newark (N. J.) Technical School in 1889 by its Director, Charles Colton, a pioneer in industrial education. It was suggested by Dr. Edward Weston, a trustee of the school and well known for being the first to have added boric acid to nickel plating baths and to have developed the low-voltage DC generator and DC instruments. The instructor was James N. Morehouse, owner of the largest job plating shop in Newark which was often used as an experimental plant for Hanson Van Winkle Company. Mr. Abraham Van Winkle, president of that company, had recommended Mr. Morehouse for the position.

The two-year course required four evenings a week: two in electroplating and two in chemistry. The chemistry course was under the direction of Mr. C. Harding, a pharmaceutical chemist. The instruction consisted of general lectures, laboratory work in qualitative analysis, and plant visitations. Of the latter, one was to the Morehouse plant and another to a brewery where a lecture was given on the principles of organic chemistry. No analysis was made of plating baths.

In the electroplating room there was a double nickel salt solution, a cyanide copper solution, and an acid copper solution called a "duplex" solution, probably because both the cyanide and the acid solution had to be used on most work that was plated. A polishing jack, a buffing lathe, an immersion alkali cleaner, and a scrub brush completed the equipment. The formulas for the solutions were from an early edition of "Langbein" and some special secret ones that were given by word of mouth.

The instruction consisted of the replating of any work that the students had supplied. Each student brought what he could find or a piece from the factory where he was employed; if he did not have any, he watched how the refinishing and plating was done by others according to the method outlined by the instructor. If the plating or finishing were not acceptable to the instructor, it had to be done over again, and thereby the student learned where he had been lax and what to watch out for in reprocessing the piece. If the article did not stand refinishing, then the student brought another.

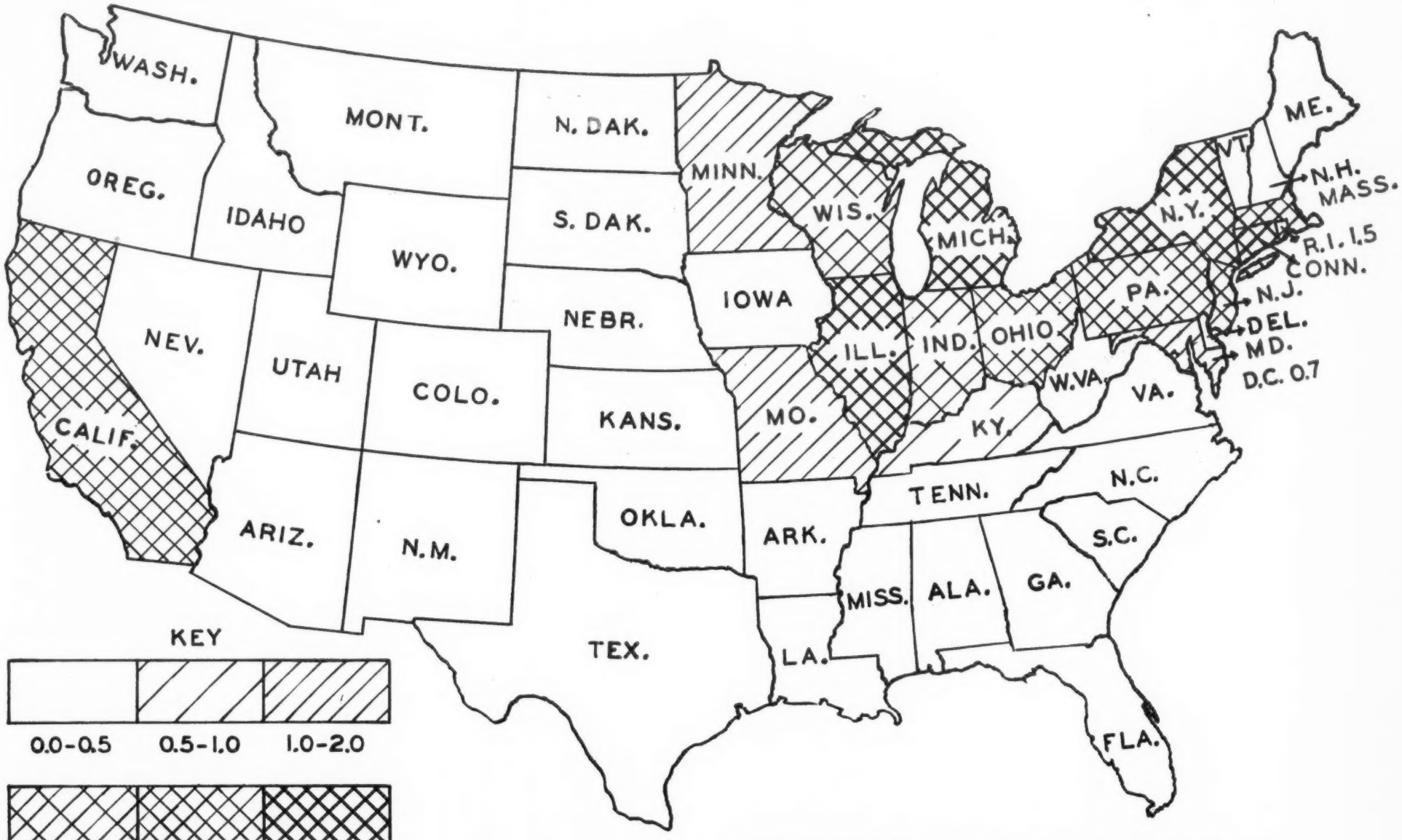
In the second year it was permitted to silver plate, and that brought many knives, forks, and spoons from the student's home and gave him the opportunity to display his ability as an electroplater; the piece of which he was proudest was always the cruet stand. Silver plating was not done until my first year in the course, in 1902, when it became known that I had been with the International Silver Company. The class tried to make a silver solution but had no success in "cutting down" the silver with nitric acid. My assistance was requested, and at the following session water was added to the nitric acid and the silver went into solution. Chloride of silver was then precipitated and taken into solution with potassium cyanide according to Langbein, which gave a working bath. The boys worked overtime that evening to plate at least one piece to take home.

The instructor requested me to wait until after the students had left and then offered me the position of taking charge of his job shop. Since I had perfected a process for producing "Royal Copper" for a silver concern that had persuaded me to live in Newark and since this concern was in the middle of the Fall trade, the position offered by Mr. Morehouse was not accepted until January, 1903.

As foreman or rather superintendent of the instructor's job shop it was not thought necessary that I attend the classes in electroplating; private instruction in pharmaceutical chemistry was deemed more advisable and I almost became a drug clerk or more probably, a "soda jerk".

After about three years in the job plating shop, a position which involved silver plating on glass was offered and accepted. In 1909 I was requested to finish the course in electroplating at Newark Technical School. After the graduation exercises in May, 1910 a dinner was given by the alumni to the then "baby class" of the school which consisted of the graduates in the several industrial courses. As president of the class I had to respond to the address by the Director, Charles Colton. His reply was my appointment as instructor to succeed Mr. Morehouse.

A new building had been constructed and in it was installed a new electroplating room. Through the courtesy of a number of friends of the school, the room was well equipped with a new generator, new tanks, new lathes, a sand blast, a lacquer spraying outfit, and electrical instruments. It was a pleasure to teach for three years the fine young men who were students. Outstanding among them were the late beloved Oliver Sizelove and Van Winkle Todd. Here I also learned how little I knew about electroplating!



DISTRIBUTION OF THE SEPTEMBER ISSUE OF PLATING. THE KEY REPRESENTS THE PER CENT OF TOTAL CIRCULATION IN ANY ONE STATE.

PLATING ACTIVITIES IN THE UNITED STATES

C. FRED GURNHAM

Consulting Engineer, Hamden, Connecticut

ABOUT TEN MONTHS ago, the Committee for Research Project No. 10 mailed a questionnaire to all Sustaining Members of the American Electroplaters' Society. The returns have been useful in the planning and conduct of Project No. 10, and some of them may be of interest to the other project committees and to the membership in general.

These questionnaires were sent to 255 Sustaining Members, and replies were received from 106; of these 84 were from firms conducting plating operations, and the balance were courtesy replies, principally from plating supply houses. The geographical distribution of the 84 returns from plates was as follows:

Connecticut	15	Indiana	2
Michigan	13	Massachusetts	2
New York	13	Rhode Island	2
Illinois	10	California	1
Pennsylvania	9	Maryland	1
New Jersey	4	Missouri	1
Ohio	4	West Virginia	1
Minnesota	3	Wisconsin	1
Delaware	2		—
			84

The states from which the greatest number of returns were submitted appear to be those containing the greatest number of plating establishments and also those in which stream pollution control is the furthest advanced. The large number from Connecticut may also be due, in part, to local interest in this.

The types of plating performed in these 84 plants are as follows:

Brass	31%	Lead	13%
Cadmium	54%	Nickel	83%
Chromium	73%	Silver	40%
Copper	79%	Tin	31%
Cyanide copper	74%	Zinc	50%
Acid copper	19%		

In addition, other types of plating and related operations were written in on some returns. It would not be correct to count these, since they were not listed on the original questionnaires, and hence results are undoubtedly low in most cases. These operations include: cobalt, gold, palladium and rhodium plating, anodizing, alumiliting, parkerizing, bonderizing, cronak processing, etc., as well as degreasing and bright dipping.

Cleaning processes included on the questionnaire were acid pickling and alkaline cleaning. These were reported as follows:

Acid pickling	81%
Ferrous	60%
Nonferrous	48%
Alkali cleaning	86%

These figures may be somewhat low, because several returns did not give this information.

The balance of the questionnaire pertained to waste disposal work of interest to Project 10, and will be reported later in the papers of that Project.

To test Dr. Gurnham's geographical distribution, we have checked it against the domestic distribution of the September issue of PLATING, *which covers 5,932 copies to firms and individuals. A glance at the accompanying chart shows that the first four states in Dr. Gurnham's tabulation are those who each took between 10.0 and 15.0 per cent of the domestic copies of* PLATING *and that the next three states belong to the group of four with 5.0 to 10.0 per cent of the domestic subscriptions, a remarkably good check. The committee did not get full representation from California and Massachusetts, each of which also receive 5 to 10 per cent of the* PLATING *copies, but otherwise the distribution of the replies is in almost perfect agreement with the distribution of* PLATING.—EDITOR.

a. e. s. research project no. 5

project director:

D. T. EWING

associates:

ROBERT ROMINSKI
WILLIAM KING

location:

CHEMISTRY DEPARTMENT

MICHIGAN STATE COLLEGE

EAST LANSING, MICHIGAN

Acknowledgement is due the Research Committee, Dr. R. M. Wick, Bethlehem Steel Company, Chairman; the Research Directing Sub-Committee, Dr. Louis Weisberg, Consulting Chemist, New York City, and Mr. B. C. Case, Hanson-Van Winkle-Munning Company, Chairman and Vice-Chairman, respectively; and the Project Committee, Mr. B. C. Case, Chairman; Mr. L. B. Sperry, Doehler-Jarvis Corporation; and Dr. R. C. Olsen, later succeeded by Mr. G. M. Cole, both of Fisher Body-Ternstedt Division, General Motors Corporation, for their contributions to this project.

Effect of Impurities and Purification of Electroplating Solutions

SOME EFFECTS OF COPPER IN NICKEL PLATING SOLUTIONS ON THE SALT SPRAY RESISTANCE OF NICKEL AND NICKEL-CHROMIUM DEPOSITS ON STEEL

Experimental

Four nickel solutions of the compositions given in Table I were tested. These solutions were purified free of copper by the high precipitation and electrolytic methods. The cathodes were 2 x 3½ inch panels of low-carbon, cold rolled, high finish steel supplied through the courtesy of Dr. Richard M. Wick and the Bethlehem Steel Corporation. They were cleaned in an alkaline silicate-phosphate cleaner, pickled in 20 per cent by volume hydrochloric acid, and plated at 40 asf in 1-liter glass battery jars. The temperature of the nickel baths was maintained at ±1° F and the *p*H (electrometric) at ±0.05 units of the values indicated in Table I. The anodes were bagged and the solutions filtered at frequent intervals. Mechanical stirring was employed at a rate of 4 ft/min of solution past the cathode. Three thicknesses of nickel deposits were prepared, 0.0003, 0.001, and 0.0015 inch, each with six concentrations of copper in the nickel solution, 0, 10, 25, 50, 75, and 100 mg/l. The rate of depletion of copper at 40 asf had been determined previously, and additions were made at the necessary intervals to maintain the concentrations of copper at constant values.

Panels to be chromium plated were prepared in the same manner, but the concentrations of copper were 0, 5, 10, 25, and 50 mg/l. The higher concentrations of the impurity were omitted from this series because the appearance of the panels would prohibit their commercial use. A jig was constructed and used to buff only one-half of the plated panels prior to chromium plating. The same buffing technique was used on all so that an as nearly constant thickness of nickel as possible was removed by this operation. Following the buffing, the panels were scoured with calcium carbonate, cleaned in alcohol, rinsed in water, pickled for 30 seconds in 20 per cent by volume sulfuric acid, and then rinsed in hot water before chromium plating. The thickness of the chromium was 0.00001 inch for the 0.001 and 0.0015 inch nickel panels and 0.000005 inch for the 0.0003 inch nickel panels.

The plated panels were tested for corrosion resistance in a commercial salt spray (fog) cabinet. The conditions were as outlined in A. S. T. M. Designation B117–44T with the exceptions that the temperature was 98° F instead of 95° plus 2 or minus 3° F and the panel sup-

ported at 20° instead of 15° from the vertical. The breakdown was reported after a condition had been reached comparable to that of a set of previously prepared breakdown standards. The salt spray resistance is reported as a percentage of the resistance of equivalent deposits from pure solutions. The buffed and unbuffed portions of the nickel-chromium panels were tabulated separately.

TABLE I. SOLUTION COMPOSITIONS

Constituent	Watts Bath	Cobalt-Nickel Bath	Organic-type Bath
$NiSO_4.7H_2O$, oz/gal	32	32	35
$NiCl_2.6H_2O$, oz/gal	6	6	8
H_3BO_3, oz/gal	4	4	4.5
Nickel benzene disulfonate, oz/gal	..	..	1.0
Triaminotolyldiphenolmethane, ml/l	..	..	0.14
Nickel formate, oz/gal	..	6	..
$CoSO_4.7H_2O$, oz/gal	..	2.0	..
$(NH_4)_2SO_4$, oz/gal	..	0.33	..
Formaldehyde, oz/gal	..	0.33	..
*p*H, electrometric	2.2, 5.2	3.75	3.5
Temperature, °F	122	132	132

Results

Some of the results of the salt spray tests on the nickel and nickel-chromium panels are given in Figs. 1 and 2; others are indicated in the following discussion.

Discussion

Considerable data has been compiled on the salt spray resistance of nickel-on-steel panels with reproducible results. In all cases the resistance decreases with increasing copper content of the nickel solution. A typical curve is shown in Fig. 1 for the Watts type nickel solution. It is noted that with the Watts type nickel solution containing 10 mg/l copper the salt spray resistance is decreased by about 25 per cent, while a fivefold amount copper about doubles the loss. The use of low *p*H in the Watts bath tended to promote pitting and special care was taken to insure that the test panels were pit-free; without such care the results were highly irregular.

The organic-type nickel bath required the addition of a wetting agent, sodium lauryl alcohol sulfate, to prevent pitting. Additional work is to be completed on the alloy and organic-type nickel solutions.

It has been noted that the heavier deposits of nickel tend to give the least reproducible results.

In preliminary work with Watts type nickel deposits the panels were suspended vertically in the salt spray cabinet by means of string. This method of suspension increased the number of hours before breakdown, but the trend in the effect of copper was the same.

The results from the nickel-chromium series also shows the effect of copper in the nickel. The chromium plate increased the number of hours in the salt spray but did not conceal entirely the effects of the copper. To illustrate the results obtained, the bar graphs in Fig. 2 were constructed from composite data on the four nickel baths. In all cases but one, copper had a detrimental effect on the salt spray resistance. The one exception occurred with the heavier deposits of nickel of which reproducible data have been difficult to obtain; the data shown was taken from one series only.

A comparison shows that with 0.001 inch unbuffed nickel, the relative effect of copper is about the same, independent of whether chromium is present or not. To check the results with nickel plate, new panels were prepared with copper as an impurity and tested in the identical manner as the nickel-chromium series; the percentage reduction caused by copper was very nearly the same for the two series.

Conclusions

Copper as an impurity in nickel solutions reduces the salt spray resistance of nickel plated steel articles. The effect of chromium plating over the nickel deposit is to prolong the time in the salt spray with the same overall detrimental effect of copper as an impurity in the nickel. Comparisons can be made between nickel-chromium and nickel plated panels by the use of a relative measure of salt spray resistance.

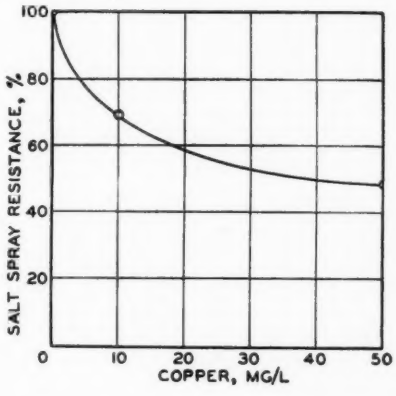


Fig. 1. Per cent salt spray resistance of 0.001 inch nickel coating on steel vs. copper concentration in Watts type nickel bath of pH 2.2 and 5.5 electrometric

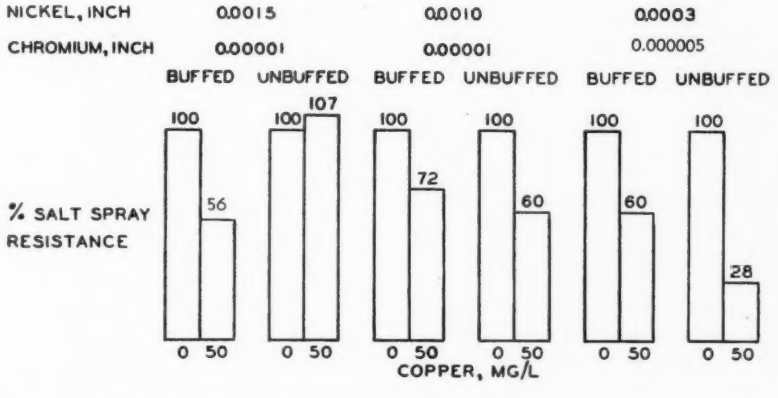


Fig. 2. Effect of copper concentration in nickel baths on salt spray resistance of nickel-chromium coatings on steel as influenced by thickness and buffing of the nickel deposit

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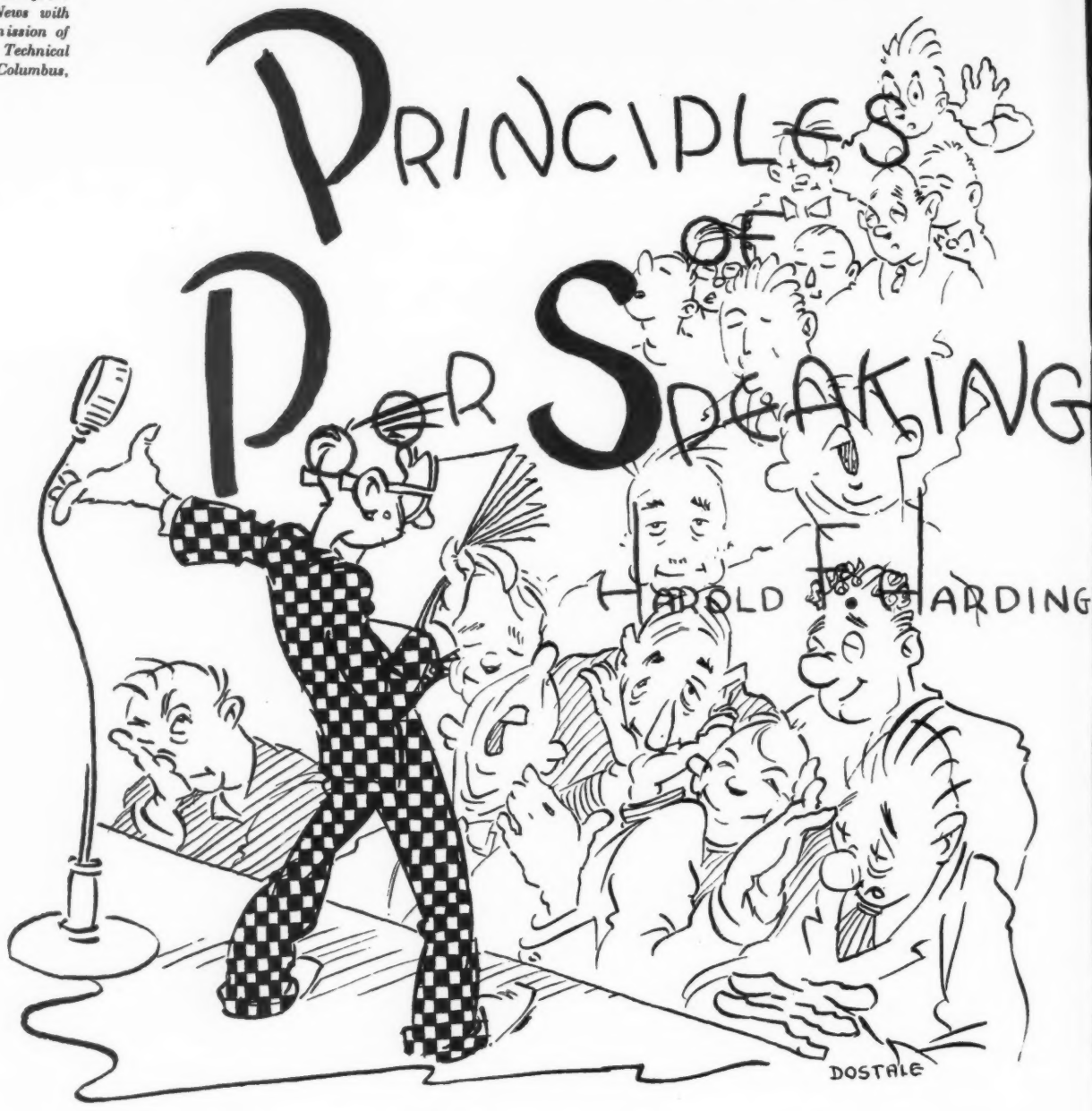
PRINCIPLES OF POOR SPEAKING



Following World War II, in which he served as a colonel in the Pacific theater, Dr. Harding (Ph.D., Cornell, 1937) studied on a Rockefeller post-war fellowship in the Humanities. He joined the Department of Speech of Ohio State in 1946. Dr. Harding was recently elected editor of the Quarterly Journal of Speech.

Contrary to popular opinion, it is fairly easy to write or to speak well. But writing poorly and speaking poorly are really difficult. To give these arts their proper due requires hard study.† Many accomplished practitioners of poor speaking are not aware of their methods. It is time that poor speaking be given the systematic treatment it deserves.

The serious student of poor speaking can well afford to consider these first principles:

1. Make no preparation in advance.
2. Give the speech no order; let it ramble.
3. Avoid a conclusion.
4. Mumble your words and don't look directly at the audience.
5. Never analyze an audience and never evaluate your performance.

Plans and Strategy

Preparation is irksome and time-consuming. Therefore, don't prepare until the night before you are to deliver the speech. Better still, give your speech impromptu and do your preparing on the spur of the moment. A sensible plan is to give again a ten-year-old lecture without revision.

Never make a study of the kind of people in your audience, and don't adapt your speech to their intelligence or their interests. When you begin, don't bother to define any new technical terms. Throw out three or four new words at the start and give them unusual or unheard-of pronunciations. This will distinguish you as an erudite speaker.

In planning an introduction, don't attempt to narrow down the subject of your talk. Cover the whole field, giving the early and the recent history. Don't omit a detail. Ability to dissertate on the entire background will mark you as a person thoroughly familiar with the tradition of the subject.

Read your speech, it's far more scholarly; don't try to master its ideas in outline form—that's the surest way to keep your audience awake. Whenever you read from manuscript, don't read it aloud beforehand. This will enable you to speak with your nose close to the manuscript. If you do weaken and speak extempore with the use of notes, don't go through the speech in advance; above all, pay no attention to any set time limit.

†See the enlightening article, "The Principles of Poor Writing", by Paul W. Merrill, in The Scientific Monthly January, 1947.

If you use up your allotted time in the introduction, you can always invade the time of the rest of the program. This adroit maneuver will serve to delay the proceedings, and it will certainly cause people to remember you as the speaker who was full and flowing over.

Modesty is old-fashioned, so use "I" frequently. The word "my" at the beginning of successive sentences always attracts attention.

Personal appearance has little relation to what an audience will think of you. Be sloppy in your dress, or be flashy, as you prefer. Stand directly behind the speaker's stand. Have the light adjusted so that it restricts the audience's view of you while speaking; then begin to mumble, holding your head in an attitude of reverence.

General Rules of Courtesy

Be late in arriving for the session and make enough commotion to attract notice when you enter. Be sure to shake hands with friends on the aisle while your predecessor is talking.

If a public-address system is available, avoid it. If one is not available complain that you cannot speak decently without one; then proceed in a slow monotone. If you speak before a microphone and to a radio audience, let the audience before you go to hang. Your outside audience is greater and, naturally, far more important.

As for tempo, or speaking rate, try to cultivate extremes of either 75 or 200 words a minute. Avoid 125 words per minute—it's a dull rate, and, if you should enunciate distinctly, you gamble on having your hearers understand individual words.

If you have a specific purpose, conceal it. When you use charts or diagrams,

make them small and the lettering faint. Talk to the chart rather than to the audience. If you use slides or film strips, make certain that the projector does not function. This will allow you to make small sketches on the blackboard with your back to the audience while you talk in a low, confidential voice.

A sure-fire stratagem is to ensure somehow that your hearers are physically uncomfortable. If it is a warm day, see that the windows are kept closed, for poor ventilation lulls people into thinking (but not about what you are saying). Don't forget to arrange for strong lights in the audience's eyes. This is the same device used so successfully in the third degree. Again, have the folding chairs wedged so closely together that there is no room between persons. Don't ask those in the rear of the room to come forward—it's vital to keep the audience scattered.

Do not exert your lung power. If you wish to succeed, speak so that the man in the back row wishes he were in the front row, the man in the front row wishes he were on the platform, and the man in the middle wishes he were back home. This is known as complete coverage.

If you know you have only five minutes left, triple your rate and get in every word. Don't lose a single sentence.

When the speech is over, forget it. Don't recall audience reaction during the speech. It is nobody's concern, except possibly your own, whether you made yourself clear or whether you persuaded anyone.

The Speech

Use long and involved sentences throughout. Join clauses with and, but, and however frequently. If your sentences run about fourteen words in length, you risk becoming downright perspicuous. Shape them into rounded periods like those of Edmund Burke and William Pitt. A sentence is scarcely worth uttering if it is less than 150 words long.

Stretch out the speech. Repeat your points. Present the same idea in any number of different ways. Then backtrack and start all over. Never organize your speech—it's too confining.

Avoid humor like the plague. If you tell stories or anecdotes or capitalize on amusing incidents of the meeting, you will be marked as an unlearned and unscientific person. Try to stupefy. Look dull and act the part. (It may take less effort than you think.)

Whenever possible use anticlimatic order. For making a reputation, there is nothing like letting down your listeners. Aristotle says that a speech should have a beginning, a middle, and an end. He was right about the first two parts, but the best poor speeches really have no end. Those who unload them just go on and on. The past masters cultivate the false, or pseudo, conclusion. You, too, can temporarily arouse your audience with such phrases as "In conclusion", "To summarize", "To conclude briefly", "Let me now restate", "I want again to recapitulate".

Don't leave any time for questions or discussion at the end of the talk. But if you are caught unawares, give one or two curt, flippant replies and sit down. Sharp controversy, don't forget, becomes a speaker, and if anyone should disagree with you the weapons to use are sarcasm, disregard of the main point, argument ad hominem, and some ill-natured questions of your own in return.

The best-known speakers have become personalities. Audiences seldom remember what they said. The moral for speak-

ers on scientific subjects is: Let your audience remember you, the speaker, and not your speech.

The rules for poor speaking are simple. The inherent good character of the speaker or his education and experience have little connection with them. The classical concept of the good orator being the good man skilled in speaking needs to be re-examined. A 1948 version is better: The poor speaker is the inadequate man with nothing to say who nevertheless can painfully consume 30 to 60 minutes of an audience's time without profit and without the slightest qualm of conscience.

Don't begin now or later to look at any books on speech organization or delivery. You will regret it if you seek advice on how to improve your speaking. If anyone suggests that you have a recording made of your voice, shun the idea. You will be disillusioned and may even become so upset as to want to do something about improving your voice—always a dangerous symptom of incipient good speaking.

LITERATURE TO BE AVOIDED

Anderson, V. A., "Training the Speaking Voice". New York: Oxford, 1942.

Bryant, D., and Wallace, K. R., "Fundamentals of Public Speaking". New York: Appleton-Century, 1947.

Flesch, R., "The Art of Plain Talk". New York: Harper, 1946.

Monroe, A. H., "Principles and Types of Speech". (Brief ed.) Chicago: Scott, Foresman, 1945.

Overstreet, H. A., "Influencing Human Behavior". New York: Norton, 1925.

Sarett, L., and Foster, W. T., "Basic Principles of Speech". Boston: Houghton, Mifflin, 1946.

Winans, J. A., "Public Speaking". New York: Century, 1915.

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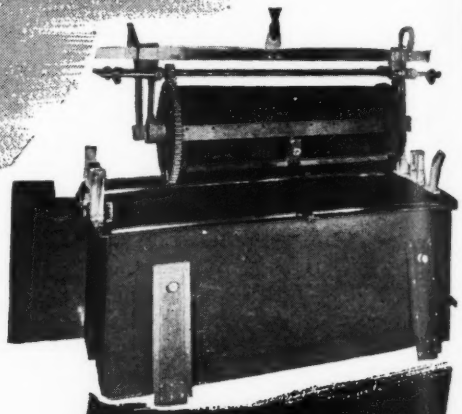

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Q. 32. We hard chromium plate a variety of parts, largely cylindrical shapes such as bolts, shafts, and pistons, with surface areas varying between 1/2 and 250 sq.in., mostly less than 30 sq.in. The management expects smooth, bright plate and specified tolerances on such mixed loads and advises us to obtain uniform current distribution by adjusting anode-cathode distances with the racks. However, we encounter a great deal of difficulty with nodular and uneven deposits. Can you help us?

A. Your management is correct in what it is seeking. To produce the desired quality when you plate a variety of parts, it is necessary to subdivide the parts into size categories and plate parts belonging to one category at a time. Once this has been done and you use the correct current density and temperature for the solution employed, you can obtain nodule-free deposits by controlling the operations prior to plating. My papers on "Hard Chrome Problems" in the 1944 Proceedings of the American Electroplaters' Society and "Surface Preparation for Hard Chrome" in the 1942 Proceedings provide this information.—A. W. Logozzo.

Q. 33. We produce in our plant a number of cyanide-containing wastes and find that we no longer can dump them into the sewer. Are there any simple methods for disposing of them?

A. The choice of method should be based on a careful engineering study of the particular plant, taking into account such factors as volume and concentration of the waste, concentration of metals and other objectionable materials in the waste, location of the plant with relation to other industries or to residential districts, availability of space in the plant, etc.

Frequently the quantity of cyanide in the waste effluent from plant may be reduced by improving the plant processes, for example, by using drag-out rinse waters for solution makeup. If this can be carried far enough, no further treatment may be necessary in some cases.

If the effluent still contains too much cyanide for discharge to the sewer, chemical treatment is required. Acidification of the waste, followed by aeration and sometimes heating, results in removal of cyanides as hydrocyanic acid gas; this process is in operation at a number of plants, generally in rural areas where the gas is not objectionable. Conversion of cyanide to thiocyanate by reaction with lime-sulfur has been used, but the toxicity of thiocyanate is nearly as high as that of cyanide. Precipitation as Prussian blue has also been utilized. A more recent development, successfully in operation in several plants, is the oxidation of cyanide by means of chlorine, in alkaline solution; this method can give substantially complete removal of cyanide under proper conditions. Most other suggested treatment processes are still in the experimental stage, and cannot be recommended for plant use without further study; these include ion exchange, reaction with formaldehyde, etc.

American Electroplaters' Society Research Project No. 10 is studying this entire problem, and its findings will be reported in the Society's journals in the form of progress and final reports.—C. Fred Gurnham.

A. Further discussion of these methods as well as an electrolytic method is presented in Mr. Oyler's article in this issue.—Editor.

Q. 34. We desire to copper plate on stainless steel at the rate of 500 asf. Is this an economical objective and, if so, what are the essential conditions for its achievement? What is the best copper solution available for this work?

A. It is assumed that you are familiar with the precautions required to obtain adhesion to stainless steel, discussed in the article by Huston in this issue. Reference may also be made to U. S. Patent 2,363,973, November 28, 1944, which describes a method of copper plating stainless steel cooking utensils by first treating them cathodically in dilute sulfuric acid and then striking them in a copper sulfate-sulfuric acid solution at 100 asf or less before transferring them to the regular acid copper plating bath. The stress in deposits from acid copper solutions is low and should not be the cause for any concern.

The simpler the shape of the article, the higher is the rate of agitation that it is practicable to employ, and the lower the required thickness of deposit, the higher is the current density that can be employed in copper as well as in any other kind of plating. Two acid copper baths appear to have especially high limiting cathode current densities. According to C. Struyk and A. E. Carlson, "Copper Plating from Fluoborate Solutions" in the September, 1946 issue of The Monthly Review, 0.001 inch thick deposits have been plated at as high as 900 asf under suitable conditions in the fluoborate bath. Equally high current densities are reported for the alkanesulfonic acid bath with only

(*Continued on page 1174*)

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Book Review

by DR. HAROLD J. READ,
Associate Professor of Metallurgy
The Pennsylvania State College

WERKSTOFF ALUMINIUM UND SEINE ANODISCHE OXYDATION (Industrial Aluminum and Its Oxidation) by Max Schenk, 1948, 1042 pages with 618 illustrations and 121 tables. Published in German by A. Francke A-G., Berne, Switzerland. Price, 138 Swiss francs.

While it has not been the practice to review in this journal books printed in foreign languages, it seems desirable to discuss Dr. Schenk's monumental work, particularly since it has been rather widely advertised in the U. S. A.

There may be those who will take exception to the writer's translation of the title, but the word "Werkstoff" is difficult to render into one or two English words which have just the right connotation. After careful examination of the book, the English title above was selected from several possible versions. This seemingly trivial matter has been given attention in order to emphasize the eminently practical character of the text and to confirm the subtitle which, literally translated, reads, "A Handbook and Fact Giver for the Practitioner".

Although the book is concerned principally with the anodizing of aluminum and its alloys, almost half of the volume is devoted to an extensive presentation of the properties, both chemical and physical, of the metal. After an introductory chapter of 29 pages which treats of the history and purposes of anodic oxidation, some 510 are allotted to metallography, working processes, heat treatments, electrochemical properties, corrosion phenomena, etc. The remainder of the book describes in meticulous detail every aspect of the oxidation process itself, including formation of the oxide layer, its properties, defect possibilities, testing, and examples of practical applications.

Extensive bibliographies appear at the ends of the various chapters, but since very few references are given in the text, the book does not serve as a convenient guide to the original literature. The text is, however, so complete that supplementary references will rarely be needed by the practical man for whom the book was written.

All of the details of editing, printing, indexes, illustrations, etc., have been handled with consummate skill, and the prospective reader whose knowledge of German is limited need not be frightened off by fear of the complicated syntax used by many scientific German authors. Dr. Schenk's style is about as straightforward and lucid as the German language permits.

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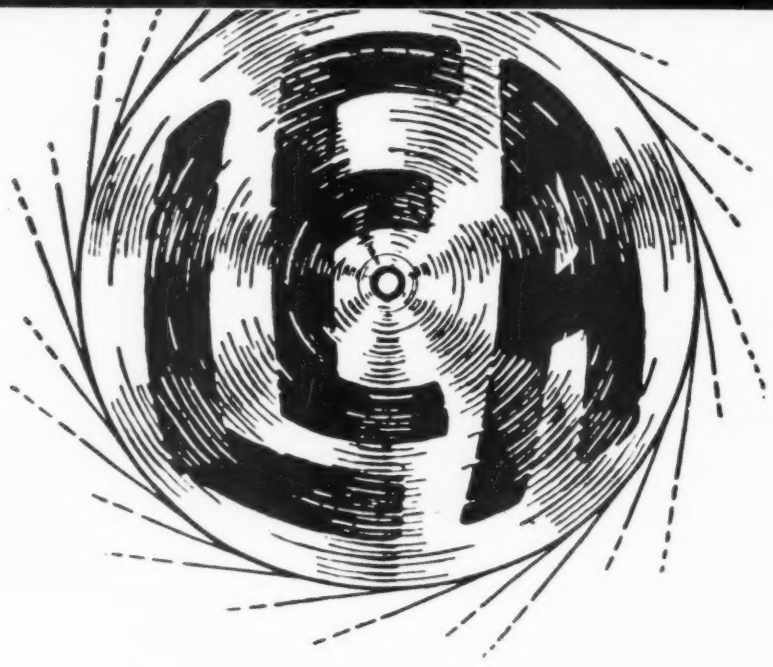

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Abstracts

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The Painting of Non-Ferrous Metals. G. T. Dunkley. Mech. World 653–657 (1948); Tech. Data Digest **13,** 53 (August 1, 1948).

The success of paint application on metal depends on the pretreatment of the surface, and the requirements vary widely for nonferrous metals. Instances are discussed in which special surface preparation and specially formulated paints are required. Electrochemical and chemical means of thickening the oxide film on aluminum and its alloys are described and a primer based on zinc chromate pigment is recommended. Any normal finishing paint may be used over the primer, but paints containing copper or mercury compounds should be avoided. Methods of treating magnesium alloys are suggested for the elimination of alkali formation on the surface which prevents adhesion of paint. As magnesium alloys are very susceptible to corrosion, careful attention must be given to the pretreatment, choice of primer and finishing paint. Pretreatment of zinc is advisable, whether it is solid zinc, a zinc-base alloy, or a zinc coating, especially new galvanized sheeting. Painting on cadmium, copper and its alloys, and lead and its alloys are also discussed.

A Review of Metal Polishing. L. Mable. J. Electrodepositors' Tech. Soc. **23,** 91–94 (1948).

A brief discussion of polishing personnel, methods, and equipment. Reference is made to a new machine, now in the experimental stage, for finishing zinc base die castings prior to plating and said to have the following advantages: (1) the job when taken from the machine is ready for degreasing and plating; (2) the time required is less than on a polishing lathe; (3) can be operated by a girl wearing a white overall; (4) dust extraction unit is not necessary.—LYMAN B. SPERRY.

Discussion of Papers on Polishing. J. Electrodepositors' Tech. Soc. **23,** 101–111 (1948).

A wide variety of comments and questions on the four preceding papers (including W. L. Pinner's, see September issue) by 23 men, and answers by W. H. Sawyer.

American equipment and practice is considered. A portion of the A. E. S. Buffalo Branch Secretary's report of its February meeting, as reported in the April issue of PLATING, which concerns the stripping of zinc base die castings, is quoted.—LYMAN B. SPERRY.

Brunak, New Antioxidation Surface Treatment for Aluminum. Michael H. Bruno and Paul J. Hartsuch. Modern Lithography **16,** No. 4, 51–53;

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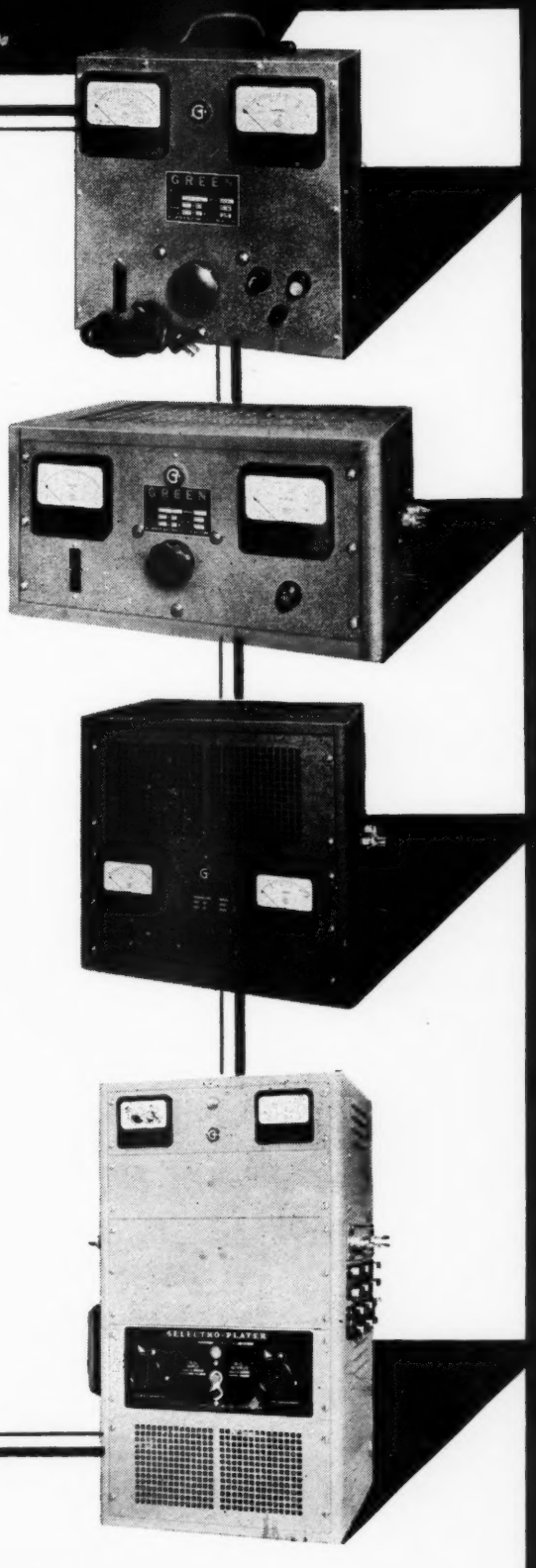

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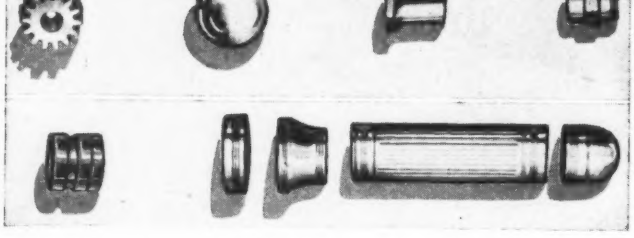

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Natl. Lithographer **55,** 26–27, 85 (1948); C. A. **42,** 4077 (1948).

In certain localities, aluminum plates used in litography often develop a pitting type of corrosion believed to be associated with the local water supply. This corrosion can be prevented or greatly retarded by bathing the plates in a solution containing 1 fl. oz. 48 per cent hydrochloric acid and 9 oz. ammonium bichromate in 1 gal. water. Operating directions are given.

The Brightening Action of Organic Sulphonates in Bright Nickel Plating. G. E. Gardam. Sheet Metal Inds. **25,** 743–746, 755 (April 1948).

Presents results of a study of the mechanism of adsorption of the sulfonate and of its brightening action. Inclusion of the addition agent was confirmed by the presence of appreciable amounts of carbon and sulfur in the deposit and the presence of waxy material after dissolution of the deposits in nitric acid. Three possible mechanisms were considered and evidence in support of adsorption on metallic nickel was obtained. The brightening action is ascribed to the smoothing action brought about by inclusion of a greater amount of sulfonate on raised areas. Periodic variations of current density cause the parallel lines typical of bright nickel deposits.

Electrodeposition of Metallic Coatings on Magnesium Alloys. R. R. Rogers and M. L. Boyd. Sheet Metal Inds. **25,** 959–962 (April 1948).

Gives results of experimental work dealing with deposition of zinc, nickel-tin-nickel and zinc-copper-nickel coatings on magnesium alloys and preferred conditions for deposition from fluoborate baths. It was found that zinc can be plated on typical magnesium alloys from a fluoborate bath, that zinc-copper-nickel coatings are less porous than nickel alone, that 1 per cent silver or lead in the 1.5 per cent manganese-magnesium alloy makes it easier to plate with zinc or nickel, and that certain conditions are common to zinc and nickel plating of magnesium alloys.

Mechanism of Electrodeposition of Nickel. III. Influence of Selenium Dioxide Addition on the Structure and Internal Stress of Nickel Deposits. G. S. Vozdvizhenskii. Zhurnal Prikladnoi Khimii **20,** 1171–1175 (November, 1947).

It was found that selenium dioxide additions to the electroplating bath, even in very small amounts (0.02 g/l), affect to a certain extent the structure and appearance of nickel deposits. It is believed that the selenium dioxice serves as catalyst for saturation of the deposit with hydrogen.

Electrochemical Cleaning of a Large Steel Casting; An Experiment. John A. Wettergreen. Am. Foundryman **13,** 120–124 (April 1948).

Gives results of a successful experiment conducted to determine the possibilities of removing fused sand and

iron oxides from the interior of a large cast-steel turbine shell by use of an electrolytic molten-caustic bath.

Metal Surface Protection by Tin Diffusion. Metalloberfläche **1**, 185–187 (August 1947); Engineers' Digest (Am. Ed.) **5**, 155–156 (March-April 1948.) Outlines procedure for and results obtained by tin diffusion into copper, copper alloys, and steel. Investigations in German shipyards have proved the good corrosion resistance of the protective layer and its applicability to high-pressure work.

Preliminary Research Accomplished with the Aid of Radioactive Zinc 65. Ch. Haenny and P. Mivalaz. Helvetica Chimica Acta **31**, 633–642 (1948). Considerable valuable information was obtained concerning the mechanism of surface reactions of zinc, deposition of zinc on gold or platinum, and separation of copper from zinc by electrolysis.

Detergent Additions Improve Pickling Bath Efficiency. Iron Age **161**, 77 (April 29, 1948).
Describes use of a complex organic sodium sulfonate designed as a wetting and washing agent at Newport Rolling Mill Division, International Detrola Corporation, Newport, Ky.

Surface Oxide Removal Important in Final Processing of Aluminum. D. E. Durkin. Materials and Methods **27**, 82–85 (April 1948).
Describes operations of cleaning and deoxidation prior to welding or anodizing, and presents data on surface resistance vs. time of exposure, immersion time vs. surface resistance on aging, and optimum treating time at a definite concentration of various solutions.

Silver Plating; Experiments with Cyanide-Free Electrolyte. A. Levin. J. Pract. Chem. (U.S.S.R.) 14, No. 1, 68–73 (1941); Electroplating **1**, 315–317 (1948).
Summarizes work on studies of the behavior of soluble complex silver compounds formed by sparingly using soluble silver compounds in the presence of an excess of the corresponding alkali compounds. Iodides were found to be the most stable. In solutions of the compound containing an excess of potassium iodide, the potential of iron with respect to silver was found to be positive (cathodic).

Plating Techniques for Rebuilding Aircraft Engine Parts. Joseph Albin. Iron Age **161**, 82–85 (May 6, 1948).
Describes an installation where laboratory-developed procedures and jigs have established standardized, production-type operations and have resulted in substantial savings. Jig designs and process specifications are given for several types of plating, including the double plating of tin-silver and lead-indium, silver plating for soft bearing surfaces, press-fit coatings, and plating to build up worn surfaces to dimension.

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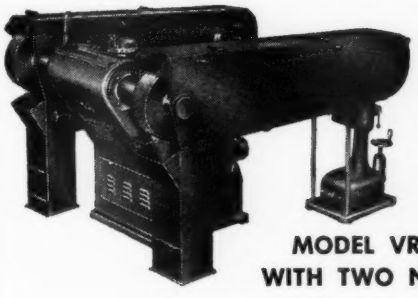

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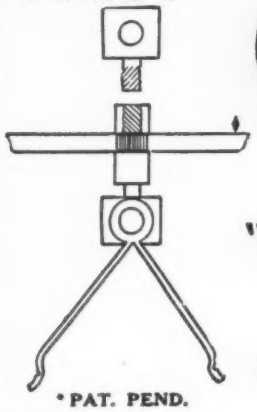

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Patents

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Consultant, New Britain, Conn.

No. 2,449,422, September 14, 1948—Electrodeposition of Nickel—L. N. Smith, assignor to Harshaw Chemical Company.

One object of the invention is to secure advantages which are inherent in the use of insoluble anodes while avoiding to a large extent the disadvantages which have attended such methods heretofore. More specifically, it is an object of the invention to provide a process whereby the concentration of the electrolyte with respect to nickel or cobalt can be maintained and a very high current density employed, utilizing a high-chloride electrolyte and without excessive loss of chlorine. A further object is to provide for superior effectiveness in the solution of metal whereby it becomes practical to use highly pure metal, such as electro-sheet nickel or other electrolytically deposited forms of nickel or cobalt, or mixtures thereof.

A suitable solution for the realization of the invention might be termed an all-chloride solution and be of the following composition:

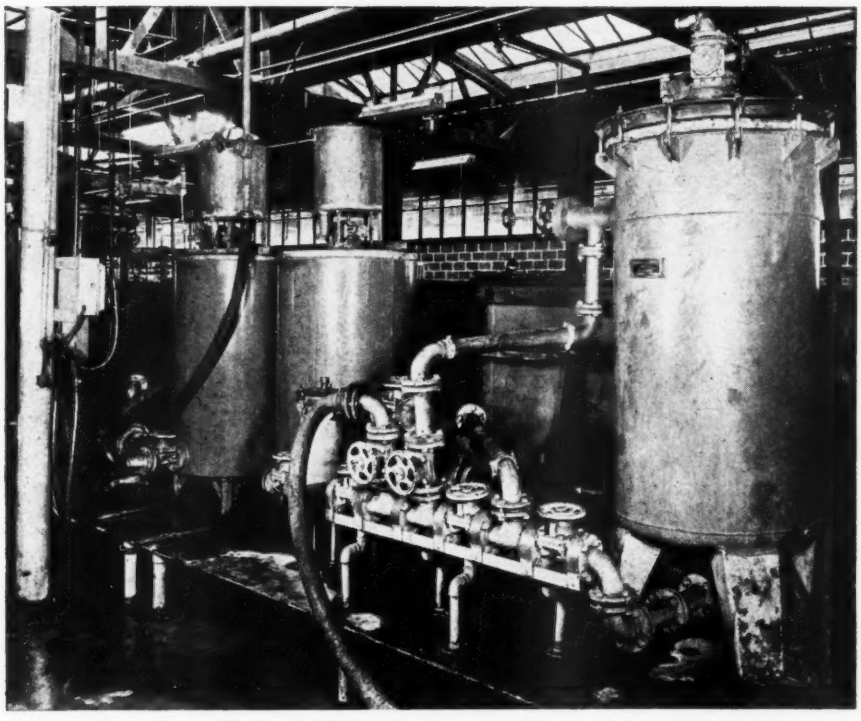
$NiCl_2.6H_2O$	75–350 grams, suitably 175 grams
Formic acid	3–15 grams, suitably 5 grams
H_2O, to make	1000 cc
*p*H	1–5, suitably 3
Current density	100–2000 asf, suitably 1000 asf
Temperature	120°–200° F

A suitable mixed chloride-sulfate bath may be composed as follows:

$NiCl_2.6H_2O$	75–350 grams, suitably 150 grams
$NiSO_4.6H_2O$	75–350 grams, suitably 150 grams
Formic acid	0–15 grams, suitably 6 grams
H_2O, to make	1000 cc
Current density	100–2000 asf, suitably 1000 asf
Temperature	120°–200° F

CLAIM 2. A plating process adapted for utilization of difficultly soluble masses of electrolytic nickel metal in electrodeposition of nickel comprising the steps of electrodepositing nickel from a body of acid nickel electrolyte containing nickel chloride by passing current through said electrolyte from an insoluble anode to a cathode whereby chlorine is evolved and the nickel chloride concentration of said electrolyte tends to be reduced, and adding nickel chloride to said electrolyte to counteract the tendency to reduce the concentration thereof by passing chlorine so evolved and electrolyte from said body of electrolyte containing nickel chloride equivalent to from 75 to 350 grams per liter of $NiCl_2.6H_2O$ into simultaneous contact with masses of difficultly soluble electrolytic nickel to dissolve nickel from such masses as nickel chloride, and returning such electrolyte with its resulting increased nickel chloride content to said body of electrolyte.

PRODUCTION
FILTRATION



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2 claims.

References cited: U. S. Patents 714,861; 1,137,874; 1,065,090; 1,386,094; 1,456,615; 1,516,122; 1,603,706; 1,900,534; 2,128,548; 2,200,987; 2,393,516. British Patents 22,355; 154,471.

No. 2,449,495, September 14, 1948—Application of Phosphate Protective Coatings to Nonferrous Metals—John C. Lum, assignor to Westinghouse Electric Corporation.

CLAIM. The process of treating members of nonferrous metals selected from the group of metals, consisting of zinc, cadmium and alloys in which zinc and cadmium predominate, in an aqueous acidic phosphate solution containing from 0.10 to 0.30 per cent of dissolved iron to provide for applying protective phosphate coatings containing iron on the members, the steps comprising immersing the nonferrous metal members in the solution to react therewith to produce thereon a protective iron-containing phosphate coating, the iron content of the solution being decreased thereby and some of the nonferrous metal being dissolved in the solution, introducing into the solution ferrous members, connecting a source of direct current to the ferrous members to render one ferrous member cathodic and the other anodic, the anodic ferrous member being dissolved in the solution, whereby to replenish the ferrous metal content of the solution to a value from 0.10 per cent to 0.30 per cent, and zinc or cadmium being deposited out of the solution on the cathodic member.

1 claim.

No. 2,449,726, September 21, 1948—Direct Coating of Silver on Iron or Steel—A. D. Slatkin, assignor to A. F. Cutten.

It is an object of the present invention to provide a method for producing silver plated or coated iron or steel without the use of an auxiliary metal coating and in which the silver coating will not be subject to peeling or cracking.

CLAIM 1. The process of applying directly to a ferrous metal cathode a coating of silver comprising placing said ferrous metal cathode in an aqueous bath having sodium cyanide 8 to 15 ounces, silver cyanide ¼ to 2 ounces, sodium chloride ¼ to 2 ounces, potassium carbonate ⅛ to 1 ounce to a gallon of water, placing an iron anode in said bath, and passing an electrical current of a value between 30 and 200 amperes per square foot of surface area of the cathode between said anode and cathode.

2 claims.

References cited: U. S. Patent 58,037. Trans. Electrochem Soc. **74**, 292–294 (1938); **80**, 459–484 (1941).

Editor's Note: The use of an iron anode in a solution containing sodium chloride will result in the iron going into solution as detrimental ferrocyanide. Incidentally, the common copper-containing silver strike deposits pure silver.

HALF

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Half of this message has to do with NORTHWEST products and processes for chemically cleaning ferrous and non-ferrous metals preparatory to plating, vitreous enameling, painting, etc., each problem involving a specific programing of one or more of the thirty-five standard NORTHWEST Cleaning Compounds including Electrolytic, Immersion, Solvent, Spray, and Water Wash types . . . the "Lo-Hi" pH process of chemically cleaning metals, preparatory to plating, porcelain enameling, etc., makes practical a control that management can plan on in these departments regardless of the type of metal or soil . . .

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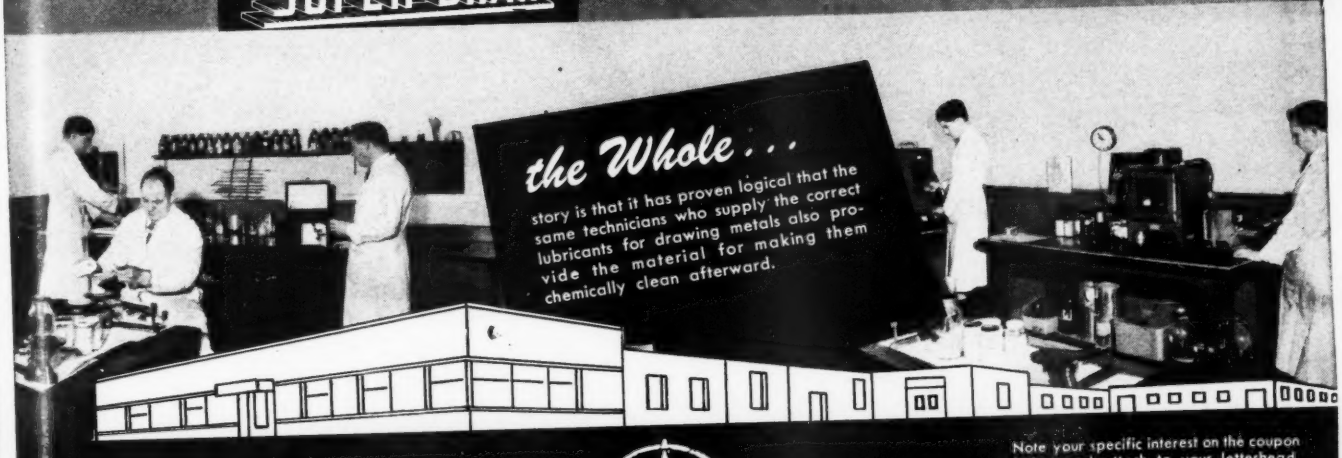

the Whole . . .

story is that it has proven logical that the same technicians who supply the correct lubricants for drawing metals also provide the material for making them chemically clean afterward.

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Stainless Steel

(*Continued from page 1110*)

surface condition of the material from which it is made. Electropolishing will not remove hard scale economically.

Fabricating grease or oil lubricants should be removed by cleaning to prevent foaming of the solution. If foaming does occur, it may be controlled by the use of chemicals developed for this purpose.

Metallic lubricants such as lead, copper, or cadmium must be removed before electropolishing. The lead or cadmium coating may not be readily recognized. If the part is a stainless steel coil or spring, a test should be made to determine first whether such a coating is present.

In general, all grades may be electropolished in a balanced bath without difficulty if they have not been harmed during fabrication. The discerning eye will notice a slight difference in color of the electropolished surfaces of the Groups I and II grade alloys and that of the Group III grade alloys.

Coloring

Some may look upon coloring of stainless steel as "gilding the lily". This is not the case; it has many practical uses. There are applications where the reflectivity of stainless steel is an undesirable quality although the high mechanical properties and corrosion resistance obtained with stainless steel are desirable. Applications on such items as camera components, radio controls, Garand rifles and other military uses are typical.

The blackening process[5] recommended by the Armco Steel Corporation produces a permanent, thin, adherent, ductile, non-reflective black coating on stainless steel without any dimensional change.

It is applied by pickling and drying the parts, then immersing them in a molten bath of sodium dichromate at 750° F for 20 to 30 minutes. They are then removed, cooled, rinsed and dried. Immersion in special oils at 120° F will eliminate the mottled gray appearance characteristic of most black oxide coatings.

A process has recently been developed for gold tinting stainless steel[6]. This color is applied in the same manner as the black oxide coating except that sodium nitrate is used for the molten salt. Colors ranging from a light straw through gold to red may be produced by proper selection of temperature.

Plating

Various metals are electrodeposited on stainless steel for purpose of color matching, lubrication during cold heading, coil forming and wire drawing processes, reduction of scaling at high temperature, prevention of galling, and staving off superficial rusting where appearance is important.

Stainless steel *may* be plated directly in standard plating solutions after the surface has first been suitably activated but only if the plating bath is highly acid, or when other plating baths are used, if subsequent rinsing in running cold water and transfers are very rapid and current is applied immediately in the plating bath. The activating may be done by immersing the parts in 20 per cent by volume sulfuric acid at 160° to 200° F until they have gassed freely for one minute. Where the subsequent handling is slow, especially in full automatics and even in some hand plating, the surface will become passive again and the plate will not adhere satisfactorily unless the plating bath itself serves to reactivate it. It is then common practice to flash the stainless steel, after activation, in a low *p*H, high- or all-chloride nickel bath and rinse it thoroughly before proceeding in the desired plating solution.

Conclusion

In conclusion, this outline is intended to inform the metal finisher of factors to be considered in finishing stainless steel. It is impracticable to review in an outline like this all the factors affected by grades, heat treatments, mill finishes, and fabrication procedures. Specific problems should be referred to the supplier of the stainless steel for details of the proper procedure for finishing the article.

REFERENCES CITED

[1] H. N. Gilbert, assignor to E. I. du Pont de Nemours & Company, U. S. Patent 2,377,876, June 12, 1945.

[2] H. R. Spence and H. W. Hooker, assignors to Hooker Electrochemical Company, U. S. Patent Reissue 22,887, June 3, 1947 (original 2,395,694, February 26, 1946).

[3] J. N. Ostrofsky, assignor to Rustless Iron and Steel Corporation, U. S. Patent 2,335,354, November 30, 1943.

[4] H. I. White, assignor to The American Rolling Mill Company, U. S. Patent 2,424,674, July 29, 1947.

[5] I. C. Clingan, assignor to The American Rolling Mill Company, U. S. Patent 2,394,899, February 12, 1946.

[6] I. C. Clingan, assignor to The American Rolling Mill Company, U. S. Patent 2,431,986, December 2, 1947.

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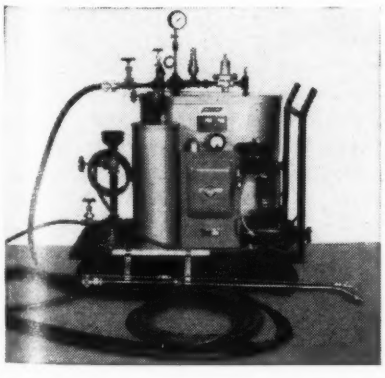
E—165. Dust-Collector Conveyors—Hapman Conveyors, Inc., 2405 West McNichols, Detroit 21, Mich., announces a standard design for a pipe conveyor to remove accumulated dry dust from collector hoppers. Dust hopper gates can be dispensed with. Dust tight connections employed between the bottom of the hoppers and the conveyor pipe prevents loss of dust and results in a self-sealing unit. The conveying system, which utilizes rubber-flighted sealed-pin chains, is said to solve the problem of handling abrasive dust. With all-round rubber flights in restricted pipe sections, operation under varied pressure or vacuum conditions is easily accomplished.

One daily collection of dust by means of a truck outside the building is claimed to eliminate all dust hazards within buildings as well as to save considerable labor. One conveyor can receive dust from a series of collector bins and convey and elevate it any reasonable height or distance. For further information, use Reader Service Card.

E—166. Plant Cleaning Machine—A portable, all-electric industrial steam cleaner is announced by Livingstone Engineering Company, Dept. 78, 100 Grove Street, Worcester 5, Mass., manufacturer of high-pressure electric steam boilers. This Speedylectric Steam-Jet Cleaner is designed to meet the demand for a really portable heavy-duty steam cleaning unit, easy to operate, completely safe, and thoroughly effective. Increasing recognition of the importance of good working conditions, tools free of grease and dirt, clean shops and washrooms, and better all-around industrial housekeeping is placing a heavy and mounting burden on plant maintenance departments. Rising wages highlight the importance of mechanizing the old mop and pail brigade with time and labor saving equipment.



The Cleaner is said to operate silently and efficiently delivering steam to the cleaning nozzle where, under fingertip control of the operator, a soap solution, solvent, or detergent is added and atomized with the high pressure steam as it impinges at jet velocity on the surface to be cleaned. Operating on AC current, 220 volts and over, single or polyphase, the boiler has capacity of 28 k.w., is A.S.M.E. National Board stamped, and has Underwriters' Laboratories listing. For further information, use Reader Service Card.

E—167. Fatigue-Reducing Mats—A number of large industrial and commercial organizations are now giving sponge rubber fatigue-reducing mats with a firm tile-rubber top surface practical tests under a wide range of working conditions, according to Flexi-Mat Corporation, 215 W. Illinois Street, Chicago 10, Ill. Previously the manufacturer had conducted extensive tests under different conditions and designed these mats to provide a means of lessening worker fatigue from standing at jobs where seating facilities cannot be used. While a soft surface footing may have some advantages in its cushioning and quietness, greater fatigue may result in some instances than with conventional hard surface floors, hence the use of hard rubber tiling on the surface of these mats. For areas where oil conditions prevail, the mats are made of oil resistant Maltese Neoprene with deep etched design on both sides to prevent slippage. For further information, use Reader Service Card.

E—168. Electrical Contact Cleaner—A new liquid product, Rotol, which is said to clean all forms of electrical contacts, has been developed by Rotol Chemical Company, 5821 Eighties Street, Elmhurst, L. I., N. Y. A check on its application is claimed to have revealed that this non-flammable, non-poisonous

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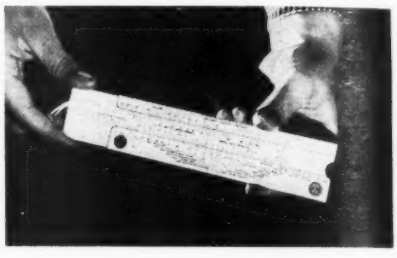
material thoroughly and safely dissolves dirt and waste which accumulates in commutators, slip rings, contact tracks, controllers, starters and regulators, cell switches, and all forms of electrical contacts. It is said to eliminate the need to use sandpaper or any other form of abrasive, to leave no residue or film, and to permit the commutator to retain the rich brown color which assures low friction. For further information, use Reader Service Card.

E—169. Plastic Coating from Self-contained Spray Unit—Krylon is the name of a transparent plastic coating material supplied by Foster & Kester Company, Philadelphia 32, Pa., in a self-contained compact sprayer can, operated by pressing a button with the index finger.

The coating, which dries in less than a minute, is said to be highly flexible and resistant to discoloration at high temperature, water, alcohol, alkali, acids, mineral oils, grease, and chemical fumes. When desired it may be removed with a special solvent. For further information, use Reader Service Card.

E—170. Brass Cleaning Process—A new process for cleaning brass, as well as copper and copper alloys such as nickel silver and monel metal, prior to electroplating is a recent development of Oakite Products, Inc., 140 Thames Street, New York 6, N. Y. It embraces the use of combined solutions of two new materials, Oakite Composition No. 91 and Oakite Composition No. 91-A. This combination is said to have demonstrated in extensive tests its ability to remove readily buffing compounds, cutting oils, forming oils, and shop dirt. The first of the two materials is a specialized cleaner, the second an additive which helps prevent the formation of tarnish on brass parts and gives excellent chromic acid tolerance. In both are incorporated a combination of wetting agents which are not broken down by the heat of the solution or the passage of current, plus special solvents and lime-sequestering agents.

E—171. Plater's Computer—The Jernstedt Plater's Computer is now available in simplified and improved form from the Hanson-Van Winkle-Munning Company, Matawan, N. J. It is said to do for the plater what a slide rule does for the



engineer. In a few seconds, he can determine (1) plating time and current density required to deposit a given thickness of any metal, (2) thickness of deposit resulting from an established plating time at a known current density, (3) usual cathode efficiencies of all modern electroplating solutions, (4) ampere-minutes per square foot to deposit 0.0001 inch of all commonly used metals at usual cathode efficiencies, and (5) scale for converting degrees Fahrenheit to degrees Centigrade. The Computer, which measures only 6 x 1½ inches, comes in an attractive vinyl carrying case.

E—172. New Lead Anode Alloy—Both service life and efficiency of Divco lead anodes are said to have been increased through use of a new alloy developed by Division Lead Company, 836 W. Kinzie Street, Dept. 117, Chicago 22, Ill.

This alloy, a combination of tin, antimony and lead, after many months' service, is said to have shown far greater resistance to chromic acid and higher electrical conductivity than plain lead or antimony-lead alloys. For additional information, use Reader Service Card.

E—173. Nickel Cyanide—Platers of gold alloy and rhodium may obtain nickel cyanide powder, claimed to be of highest purity, from John L. Snowber, 12 E. 41st Street, New York 17, N. Y.

E—174. Plating Filters—A new series of filters, constructed of Saran-lined steel pipe and fittings and rubber-lined filter-

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1—2000/1000 Ampere, H-V-W, 690 RPM
1—1250/625 Ampere, H-V-W, 850 RPM
1—1000/500 Ampere, Chandeysson, 690 RPM
1—1000/500 Ampere, Columbia, 1150 RPM
1—1000/500 Ampere, H-V-W, 1150 RPM
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3—1500 Ampere, 20 V. Elec. Prods.
1—67 Ampere, 24 V. West.
1—600 Ampere, 24 V. Reliance
1—200 Ampere, 25 V. Star
1—1000 Ampere, 25/35 V. Diehl
1—300 Ampere, 25 V. Star
1—175 Ampere, 25 V. Cr. Wh.
1—500 Ampere, 32 V. Columbia
2—100 Ampere, 30 V. Gen. Elec.
1—200 Ampere, 30 V. West.
2—200 Ampere, 32 V. Gen. Elec.
2—1500 Ampere, 32/40 V. Elec. Prods.
1—1000 Ampere, 33 V. Gen. Elec.
2—200 Ampere, 42 V. Gen. Elec.
3—1500 Ampere, 45 V. Century
1—1500 Ampere, 50 V. Gen. Elec.
2—800 Ampere, 50 V. Gen. Elec.
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6—1500 Ampere, 50 V. Elec. Prods.
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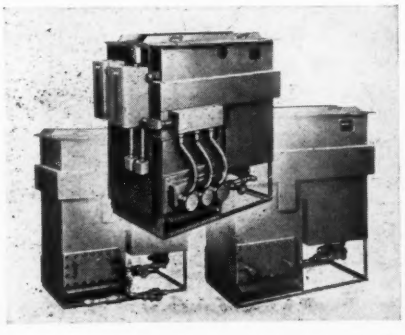
and precoat-tank, has been announced by Titeflex, Inc., 722 Frelinghuysen Avenue, Newark 5, N. J. Both lining materials have high resistance to erosion and abrasion as well as to most common chemicals. Being good heat insulators, they are said to help maintain the temperature of the solution being filtered, which may be from 0° to 180° F.

Designated as series SLA, these filters use the same filtration principle as other Titeflex filters: a rigid synthetic membrane of porous stone supports the filter aid which removes suspended particles down to 1/10 micron. A new method of back-washing cleans the filter in a few minutes. The filters are put into operation by turning a few valves and are almost completely automatic. The SLA 1000 filter shown in the illustration has a capacity of 1860 GPH open pumping; other sizes are available. For further information, use Reader Service Card.

E—175. Paint and Lacquer Remover—The Magnus Chemical Company, Inc., Dept. P-1, Garwood, N. J., announces the development of Magnus Stripit, an improved ready-to-use, non-flammable material for removing paint and such other coatings as lacquer, primer, synthetic enamel, baked and air-dried varnish, and baked automotive finish from metal or wood.

Stripit is said to offer several advantages over ordinary paint removers. It is safe on any metal and will not bleach or raise the grain of wood. Under normal conditions it will remove at least three coats of paint in one application. The first coat begins to pucker in one to five minutes. Ordinarily the action of Stripit is so thorough that a cutting stream of water directed against the surface will remove all loosened paint in a few minutes.

E—176. Degreaser with Quick-Conversion Heating—Announcement of the new "625" Degreaser, a two-dip hand-operated unit designed for cleaning of medium-size metal parts, has just been



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Phone: TAshmoo 6-3959

at the particular time and location. It can also be furnished for combined gas-and-steam or gas-and-electric heating. A most important and unique feature of this new design of equipment is the standardization of main body construction so that it can be quickly converted from one type of heating to another where seasonal changes in heating method give added economy or convenience.

The Detrex '625' Degreaser employs the immersion-solvent-vapor degreasing process originated by Detrex some years ago and used in many thousands of manufacturing plants. It is of all-welded construction, fabricated from 10-guage steel plate and reinforced with structural steel.

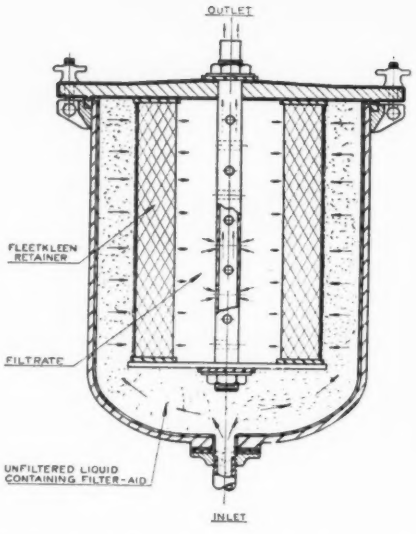
Production capacity is conservatively rated at 1,000 pounds of steel parts per hour. This unit will immersion-clean parts that will go into a space 18 x 21 x 12 inches deep; shafts up to 4 feet in length can be cleaned in the vapor zone. Occupied floor space is about 10 sq. ft. and net weight approximately 500 pounds. For further information, use Reader Service Card.

E—177. Dry-Grinding Abrasive Belt—Behr-Manning, Troy, N. Y., has announced the release of a new Metalite Cloth belt, Resinall Metalite. Taking its place between the Durabonded Metalite belt and the Speed-Wet Metalite belt, the new belt is used in dry grinding operations involving heat. It is made with a thermosetting resin adhesive and utilizes the same sharp, tough aluminum oxide abrasive, the same stout backing, and the same Durabonding treatment as the other abrasive belts manufactured by this concern.

For any operation in which the high heat of cut may prematurely break down glue-bond belts, Resinall Metalite is said to deliver 2 to 4 times as much production. It has been put on the market only after having passed rigid laboratory, factory and field tests. For information, use Reader Service Card.

E—178. Plating Filter—A new filter called Fleetkleen is offered to the trade by Co-Operative Industries, Inc., 100 Oakdale Road, Chester, N. J., and described in a recently issued catalogue.

The retaining elements are porous stone or carbon as required, placed in a filter tank. The complete units include precoat tank, centrifugal pump, diaphragm-type valves, and suction hose, and are mounted on steel base, with rubber-tired casters for the smaller units. Three types are available, with plain steel, rubber covered steel, and stainless steel filter tanks and accessories. For each, pump sizes vary from 2 to 2,500 gallons per minute through the filter. The precoat tank may be arranged as a slurry



feeder tank for continuous feeding of a controlled flow of filter aid. For further information, use Reader Service Card.

E—179. Protective Rust Remover—"Farrellok", a treatment material sold by Farrelloy Company, 1245 N. 26th Street, Philadelphia 21, Pa., for removal of rust, protection from corrosion, and preparation for painting, combines chemically with the metal to form a highly ductile phosphate coating, said to be an excellent paint base which does not flake off even when bent or dented. The solution may be used hot or cold and is adaptable for cleaning alloys of steel, cast iron, and zinc base metals, being equally effective on all ferrous metals except stainless steel.

An absortptive of oil as well as paint, the coating may be finished with an oxidizable oil for long-time protection from corrosion. "Farrellok" may be applied by dipping, spraying, or brushing, and is non-inflammable. For further information, use Reader Service Card.

Why Pay Extra?

Have You Tested

BUNATOL No. 1000

Rack Insulation?

If not, send us one of your racks and we will insulate it—with No. 1000 (no charge), so an actual test can be made. Then compare results and prices. No need to pay an extra price for a long life insulation when BUNATOL is available. Have the best in quality at our low price.

Remember, No. 1000 is 100% solids. No evaporation—no loss. Just a prime, a dip and bake, all in about two hours. Saves labor and time. Cost is negligible compared to results.

Send a rack today and find out about this low cost insulation. Test and compare prices.

NELSON J. QUINN CO.—TOLEDO 7, OHIO

BUNATOL

Announcing

PERFECTION GREASELESS

SAVES YOU 50-80%

OVER COMPARABLE MATERIALS NOW BEING MANUFACTURED

FORMERLY AVAILABLE IN LIMITED QUANTITIES — NOW AVAILABLE FOR IMMEDIATE SHIPMENT

PROVED BY ACTUAL USERS TO BE A TIME AND MONEY SAVER!

"Hold our next shipment until the old material is used up. Workmen will not use other Greaseless while yours is within reach."
CONNECTICUT MANUFACTURER

"Start shipping 2000 lbs. monthly. Test came off with flying colors."
CALIFORNIA HARDWARE CONCERN

"We are well pleased with your Perfection Greaseless. Enclosed find order for immediate shipment."
NEW YORK CUTLERY MANUFACTURER

"Well pleased with your three Greaseless Compounds. Our finished product is improved by your W-81 Perfection Finisher."
NEW JERSEY CONCERN

"We fully expect to save $25,000 in a 12 month period."
LARGE SILVERWARE CONCERN

20c

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F. O.
STRATF

"Superior to the present material used in all respects . . . further we paid 32c for a grade that you are selling for 20c."
RELIABLE SILVERWARE MANUFACTURER

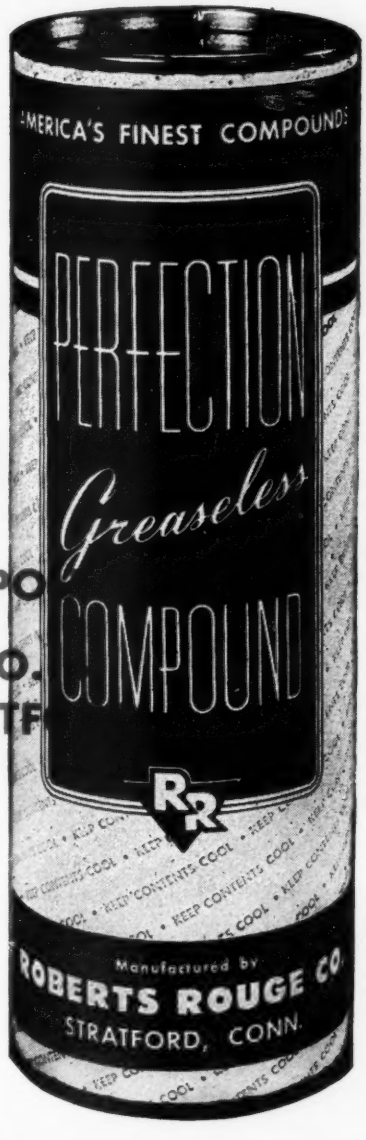
"You have done a fine thing for our industry."
CONNECTICUT MANUFACTURER

"The three Greaseless Compounds are doing a swell job. Would hate to let you know what we used to pay for this material. Kindly acknowledge order and schedule on a weekly basis."
INDIANA CONCERN

"Men satisfied and happy . . . and we appreciate the savings."
MILKING MACHINE MANUFACTURER

"For a long time we have been looking for a time-saving greaseless compound. After using yours, our expectations were exceeded by far."
DIE CASTING COMPANY

"We save money by using Roberts Greaseless. It cuts finishing costs tremendously . . ."
VACUUM CLEANER MANUFACTURER



There is only one way to convince yourself of the superiority of ROBERTS GREASELESS . . .

Send for Free Sample

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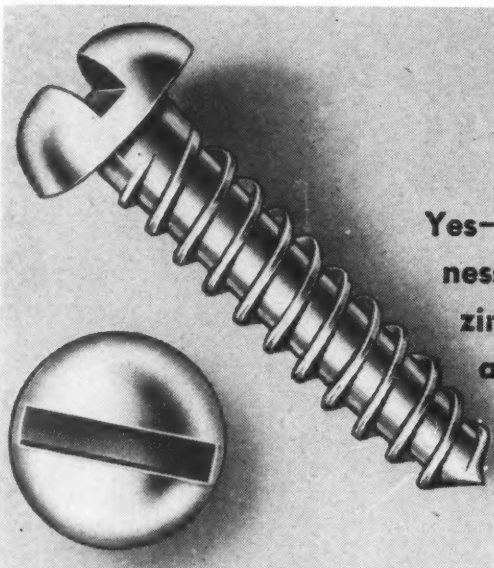
STRATFORD • CONN.

PROOF POSITIVE!

LOW-COST LUSTER-ON* ON ZINC OUTLASTS CHROME ON NICKEL 12 to 1!



Yes—thickness for thickness, Luster-on-dipped zinc matches brilliance and color, costs far less, protects 12 times as long!

On screws and similar closures where plating thicknesses are limited, it's thickness-for-thickness protection that counts. Now user tests in salt-spray cabinets prove conclusively that barrel-plated zinc screws basket-dipped in cold Luster-on resist corrosion at least 12 times as long as equal deposits of barrel-plated bright nickel followed by rack-plated chromium.

But think of the saving in time — no racking — just easy basket-dipping in cold solution!

And the difference in cost — inexpensive zinc and Luster-on instead of high-priced, scarce nickel and chrome!

In short, here is a cheap finish that looks like chrome — goes on easier — and costs far less. The answer to a closure maker's prayer!

Mail the coupon today for new Luster-on brochure with full information. Send a sample part from your own production run — we'll gladly process and return it free.

84

*Reg. U.S. Patent Office

THE Chemical CORPORATION

54 Waltham Ave., Springfield 9, Mass.

THE CHEMICAL CORPORATION
54 Waltham Ave., Springfield, Mass.

Please send me full particulars about Luster-on* bright dip for zinc-plated surfaces. I am (am not) sending sample for free dip. No obligation, of course

Name _____

Firm _____

Address _____

New Literature

L—131. Non-Slip Floor Surfacing—A 4-page literature piece and card of swatch samples of "Safety-Walk" surfacing for floors, decks, catwalks, steps, and ramps in a variety of industries may be obtained from Minnesota Mining and Manufacturing Company, 900 Fauquier Street, St. Paul 6, Minn. Typical installations are pictured featuring unusual jobs. The material consists of hard mineral grains, surface-coated on toughened fabric, and is made in rolls or factory-cut stairway strips, brick and tile-size cleats, which are applied with adhesive. For your copy, use Reader Service Card.

L—132. Upright Drum Truck—A new hand truck for drums and barrels with an exclusive "floating axle" design which holds the truck in a safe, upright position, has just been announced by American Pulley Company, 4200 Wissahickon Avenue, Philadelphia 29, Pa. Full details are contained in a 4-page pocket-size folder. For your copy, use Reader Service Card.

L—133. Controlled-Volume Chemical Pumps—This technical paper, written by Robert T. Sheen, Consulting Engineer with Milton Roy Company, 1411 E. Mermaid Road, Philadelphia 18, Pa., and reprinted from a recent issue of Chemical Engineering Progress, discusses automatic chemical feed systems, their applications, and how they function. For your copy, use Reader Service Card.

L—134. Water-Emulsion Wax—Literature is now available on the new Johnson's 1568 wax that is said to be successfully used as a rust-inhibiting coating for black-oxidized, phosphated, and untreated metal surfaces. This wax, manufactured by S. C. Johnson & Son, Inc., Racine, Wis. is applied by conventional dipping, spraying, wiping, or flow-coating, and forms a dry coating. It is non-flammable and non-toxic, gives high coverage of between 250 and 300 square feet per gallon, and can be readily removed by degreasing if desired. For your copy, use Reader Service Card.

L—135. Buffing and Polishing Wheels—American Buff Company, 2414 S. La Salle Street, Chicago, Ill., has just published a striking book about Buffing and Polishing Wheels in the industry. Finished in gold, it is one of the finest books about a firm's products that is available in any industry.

New Literature

While a catalog of American Buff Company products, it goes beyond this function to present an informative text on the construction, quality, and application of buffs and polishing wheels.

Following a history of the firm, the book goes on to describe its new developments, policy, advertising, and research. Quality being an all-important feature, informative paragraphs are devoted to the ingredients, measure and economy of quality, and stresses the importance of selecting the correct buff or wheel. Factors that determine wheel design, dimensions of the wheel, and the peripheral speed of a wheel are dealt with in other chapters.

The book then gives illustrations and detailed descriptions of specific buffs and polishing wheels: two types of bias buffs, the Amflow and the Shurflow; pocket buffs; full disc buffs; square sewed buffs; pieced buffs; sisal buffs; jewelers' buffs; and dental buffs. Another section is devoted to detailed descriptions and illustrations of polishing wheels. One page is devoted to polishing wheels generally and subsequent pages to combination cloth and paper, canvas, sheepskin, bullneck leather, walrus leather, and felt wheels, as well as felt bobs and contact wheels. For your copy, use Reader Service Card.

L—136. pH Papers—A 4-page bulletin put out by Paul Frank, 118 E. 28th Street, New York, N. Y., describes the various pH papers which again have become available and their applications. One series of such papers have been designed especially for use with plating solutions. For your copy, use Reader Service Card.

L—137. Washing Machines—Emphasizing the fact that every metal-product cleaning problem is different, a new 28-page, 2-color catalogue just published by The Alvey-Ferguson Company, Disney Street, Cincinnati 9, Ohio, takes the reader through the process of what to look for when selecting a washing machine.

Profusely illustrated to give the complete story, this new book carries the reader quickly through all construction features. The skeleton, pump screening facilities, heating systems, skin box drain and overflow, inspection and clean-out doors, dryers and various types of conveyors are detailed for quick comparison. The "Super Spray" washing action that is said to effect big savings in time and materials is clearly explained and illustrated.

A section of the book is devoted to the Completely Coordinated Conveyorized Systems engineered by The Alvey-Ferguson Company to solve specific problems. Flow charts show how the equipment can be integrated into a line production system. For your copy, use Reader Service Card.

L—138. Purchasing Standards—The National Bureau of Standards has just published a 322-page Supplement to the National Directory of Commodity Specifications, which together provide a complete listing by name, designating number, and issuing or sponsoring organization of all the standards, specifications and methods of test in general use in this country. About 44,000 specifications are included, each briefly summarized as to technical characteristics, scope and special applications.

The Directory, 1945 edition, costs $4.00 per copy and the 1947 Supplement $2.25. Both are available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

L—139. Chemical Pumps—Among other features of the new 4-page Bulletin 484 on chemical pumps released by Milton Roy Company, 1300 E. Mermaid Lane, Chestnut Hill, Philadelphia 1, Pa., is a

ONE SOLVENT...

for all Metals or Combination of Metals

NEW SCIENTIFICALLY IMPROVED

BLACOSOLV

FOR SOLVENT VAPOR DEGREASERS

No need to use a special solvent for cleaning a combination of metals—BLACOSOLV degreases them all . . . Safely . . . Quickly . . . Economically.

BLACOSOLV is the most highly stabilized solvent . . . ideal for aluminum, magnesium, brass, copper, steel, etc., either individually or in combination. It is non-inflammable—is positively safe—will not stain or dull even the most highly polished surfaces . . . the one price solvent for all metal degreasing jobs. Its economy is increased in the uninterrupted service it affords you in your production.

Write today for FREE BOOKLET ON Degreasers and application with Blacosolv 'the all purpose degreasing solvent.

BLACOSOLV DEGREASERS AND SOLVENT

NIAGARA METAL PARTS WASHERS

G. S. BLAKESLEE & CO.

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS
NEW YORK, N. Y. TORONTO, ONT.

New Literature

capacity-pressure chart, a selection chart in simplified form. Production men will find this folder comprehensive in its coverage of this line of controlled volume pumps, the pumps being especially designed for pumping small as well as normal volumes, pumping at high pressures, and handling of different corrosive materials. For your copy, use Reader Service Card.

L—140. Protective Coatings—Three bulletins, Nos. 24, 35, and 40, issued by Nukem Products Corporation, 116 Colgate Avenue, Buffalo 20, N. Y., cover respectively "Acid and Alkali Resistant Resin Coating", "Acid and Alkali Proof Tank Lining", and "Acid and Alkali Proof Resin Coating". All are printed in two colors, and treat their subject matter in a succint and informative manner. For your copy, use Reader Service Card.

L—141. Liquid Pumps—A 6-page Bulletin No. 245 on the manufacturer's line of liquor pumps for the process industries has been issued by Warren Steam Pump Company, Inc., Warren, Mass. Types L, LS and A are given special treatment. They have a wide range of applications, which include pumping of hot or cold erosive or corrosive liquids. For your copy, use Reader Service Card.

L—142. Product Index—E. F. Houghton & Company of Philadelphia has issued a new attractive 6-page product index designed to guide purchasers in the applications of Houghton products. The products, which are listed by trade name and individual applications, include lubricants, metal working textile processing, leather oils and greases, and hydraulic and transmission products. The back cover of the new product index is devoted to a listing of Houghton's seventy-five world-wide offices. For your copy, use Reader Service Card.

L—143. Weighing Scales—Six 3-color technical bulletins, totalling 68 pages of data, diagrams, advice on selection, and practical applications of dial scales, have just been published by The Yale & Towne Manufacturing Company, 4530 Tacony Street, Philadelphia 24, Pa. All are bound into neat cover holders for quick reference and easy filing. The series deals with, respectively: Counting scales, bench scales and portable platform scales; dormant platform scales; crane scales; and weigh can scales. For your copy, use Reader Service Card.

L—144. Blower Equipment—"Lungs for Industry" is the title of new 16-page bulletin describing the line of industrial and commercial blower equipment produced by General Blower Company, 8600 Ferris Avenue, Morton Grove (a suburb of Chicago), Ill., now in its new plant. Profusely illustrated, it covers a complete line of blowers, fans and exhausters for blowing, heating, cooling, conveying aerating, separating and agitating. For your copy, use Reader Service Card.

L—145. Burnishing Barrels—Bulletin BB-103 issued by Hanson-Van Winkle-Munning company describes the Mercil-Type Burnishing Barrel for fast, efficient mass burnishing of small parts. Features of construction are: Cover on swivel, requiring only a moment to fasten with barrel in any position; reducer-type direct-connected drive with motor completely protected for quiet operation; three roller bearings which assure proper alignment and aid in supporting the loads; internal gear fastened to bottom of burnisher from outside, eliminating the necessity of removing lining blocks when gear or shaft change is necessary.

The unit is self-contained, needs no assembling. All that is required for immediate operation are lag screws for fastening to the floor and the necessary electrical connections. For your copy, use Reader Service Card.

L—146. Protective Coating for Concrete, Masonry and Steel—Sica Chemical Corporation, 35-49 Gregory Avenue, Passaic, N. J., offers a Bulletin No. S-3 which describes Seca Seal, said to be adherent to wet surfaces and resistant to water, including chlorine water, and 5 per cent solutions of common acids and alkalies. For your copy, use Reader Service Card.

CHROMIUM CHEMICALS
FOR THE ELECTROPLATER

MUTUAL CHEMICAL CO. OF AMERICA
NEW YORK

OVER A CENTURY OF CHROMIUM CHEMICAL PROGRESS

- CHROMIC ACID
- BICHROMATE OF SODA
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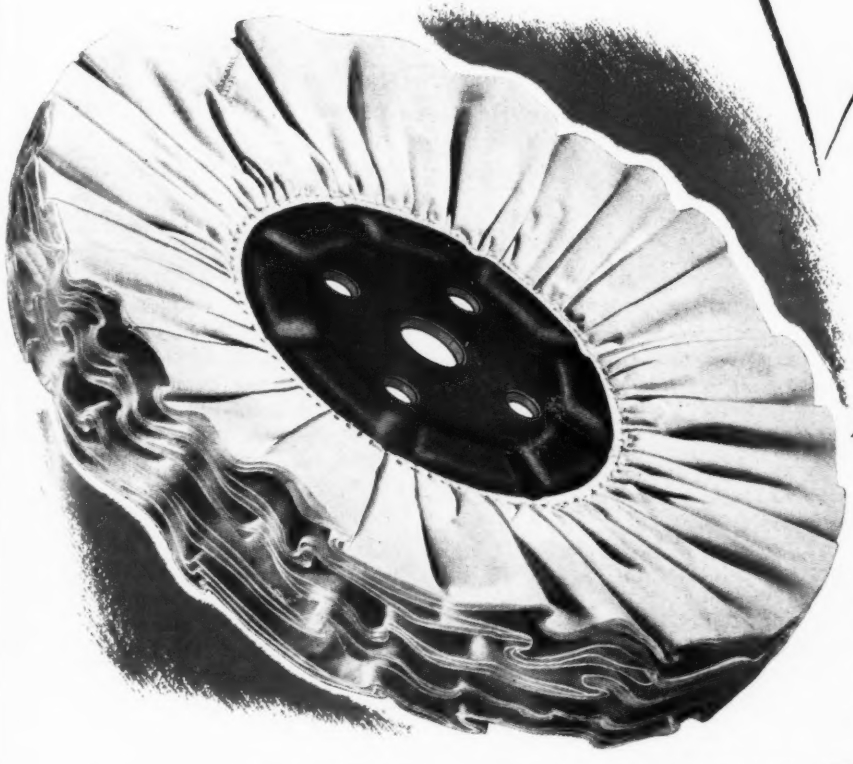
MUTUAL CHEMICAL COMPANY OF AMERICA
270 MADISON AVENUE NEW YORK 16, N.Y.

We are realizing Greater Production- and GREATER PROFITS- now that we are using CODMAN'S REAL-VENT Ventilated Non-Fray BUFFS

GOOD BUFFING JOBS — done faster — with buffs that will stand up longer at high or low speeds — is the goal of all practical finishers. CODMAN'S *REAL-VENT BUFF (either open, or closed face), with its revolutionary thin-pressed center and non-compressible ventilating channels, is the hard working profit-maker that is making this goal possible. Write for details, today.



CODMAN'S REAL-VENT Ventilated Non-Fray buff is made under patent Nos. 2,027,863; 2,094,650; 1,573,961; Re. 19,894; 2,140,208. Other patents pending.

THE MARK OF QUALITY

For Over 50 Years the Greatest Name in Buffs

BUFFING AND POLISHING WHEEL FOR EVERY OPERATION

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ROCKLAND · MASSACHUSETTS

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DETROIT
LOS ANGELES
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Buffing and Polishing
COMPOUNDS-

STAND OUT!

To make your products stand out competitively, specify HARRISON cake or liquid compounds. Their fast cutting and quick cleaning action insure economy of operation.

SPECIAL: Harrison has developed a new dip compound that creates a head on the buff. You get a deeper cut . . . use less compound . . . save!

At your request, our experienced technical representatives will call to advise you on special problems.

Cement • Buffs • Buffing and Polishing Compounds
HARRISON & CO., INC. • HAVERHILL, MASS.

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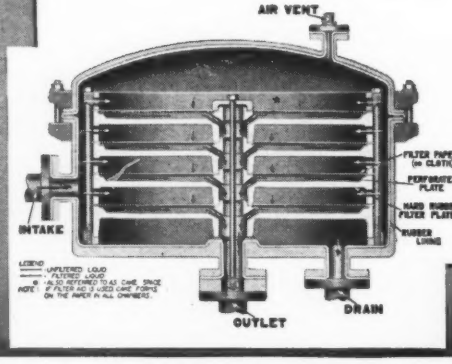
Filter All Plating Solutions Faster, More Completely in

SPARKLER
Horizontal Plate
FILTERS

Because the filter cake is held horizontally, it is absolutely stable to the end of each filtering cycle. And cycles are longer because the cake retains its porosity longer. That is why the "horizontal principle," as embodied in Sparkler filters, gives you more efficient, low cost, operation. Sparkler filters are pressure-tight and leak-proof, designed for intermittent or continuous operation.

4 Plating Solution Types
1. Rubber-lined for bright nickel
2. Stainless steel for acids
3. All Iron for alkaline solutions
4. All Steel (with Stainless Pump) for chromium

SPARKLER MANUFACTURING CO.
Mundelein, Illinois



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Our Engineering Service is available for any specialized problems.

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A. E. S. News

The Milwaukee Convention June 27 to 30, 1949

The Milwaukee Branch, host to the next Convention, has now organized its Convention Committee and Sub-Committees. The chairmen appointed to date are as follows:

General Chairman—WILLIAM C. GEISSMAN
General Co-Chairman — HENRY BORNITZKE
Educational—LESLIE DIVELEY
Finance—ROBERT STEURNAGEL, JR.
Registration—FRANK MARZ
Hotel Reservations—GLEN SCHWEMER
Program—TED HARTSHORN
Entertainment—JACK DAVIS
Hotel—EVERETT ROBINSON
Publicity—VINCENT MATTACOTTI
Banquet—RODNEY OLSEN
Luncheon—AXEL JOHNSON
Outing—R. F. McGUIRE
Ladies' Program—MRS. R. F. McGUIRE

The Editorial Board of the Society which consists of the Associate Editors and the Editors of PLATING and which is now responsible for the procurement of Convention papers, met with Mr. Diveley on October 13 in the Chemist Club, New York City, to lay plans for the Educational Sessions. Requests for papers will be forthcoming by the time this issue reaches the reader.

At the suggestion of the Advisory Survey Committee, appointed by President S. S. JOHNSTON, there will be no Industrial Finishing Exposition in Milwaukee. Past President W. M. PHILLIPS, Chairman.

Plans are also being laid for the entertainment of the Convention visitors. Not only will there be the regular banquet, but there is also being planned a luncheon and a picnic outing. The Ladies Committee will arrange suitable entertainment for the ladies.

New features and details of those mentioned here will be announced from time to time.

Plan now to attend!

Paper Awards Committee

President Johnston has appointed to the Paper Awards Committee for the 1949 Convention Mr. C. H. Sample, The International Nickel Company, Chairman; Dr. R. A. Schaefer, Cleveland Graphite Bronze Company, and Dr. E. A. Parker, Technic, Inc.

Research Committee Meeting

The Research Committee met for an all-day session on September 17 in Hotel Seneca, Rochester, N. Y. All members were present except C. H Sample, A. S. T. M. liaison member. A special welcome was extended to the new members: N. E. Promisel, H. L. Struckhoff, Dr. W. A. Wesley, and Dr. H. J. Creighton, the new liaison member from the Electrochemical Society, as well as to J. J. Duffy, Jr., of the Research Finance Sub-Committee, G. M. Cole of General Motors Corporation, and C. N. Hendershott, R. L. Flint and J. Weaver, officers of the Rochester Branch, A. E. S.

The Committee was informed that Sub-Committee II of Committee B-8, A. S. T. M. had undertaken to prepare the rating standards for plated coatings on nonferrous metals required for the evaluation of the panels to be exposed by Project No. 4 on "Effect of Surface Finishing of Nonferrous Base Metals on the Protective Value of Plated Coatings".

The number of sustaining members had increased by two since May 31 to 267.

The Vice-Chairmen of the Research Finance Sub-Committee under Dr. H. L. Kellner are H. J. Struckhoff, Lasalco, Inc.,; J. J. Duffy, Jr., Pennsylvania Salt Manufacturing Company, Philadelphia; and Clyde Kelly, Driscoll Company, Chicago.

Project No. 8 on "Polarization at Electrodes in Electroplating Processes" from which the Project Director, Dr. A. L. Ferguson, retired some time ago is to be held inactive for the time being and the Project Committee was disbanded. It was agreed to appoint a special committee to formulate the program for Project No. 13 on "Preparation and Cleaning of Metals Prior to Plating".

Dr. Victor Zantner has been appointed A. E. S. Research Associate on Project No. 9. He began his work on August 25.

W. R. Huey of the Wilmington Office of E. I. du Pont de Nemours & Company has been appointed to Project Committee for Project No. 10 on "Disposal of Plating Room Wastes" to succeed Malcolm Orr, whose resignation was accepted with regrets.

All active projects are going forward in an excellent fashion and a number of valuable reports will be published in PLATING during the coming year.

A. E. S. Liaison to A. S. T. M. and N. A. C. E.

The Executive Board, at its meeting on September 25, appointed Mr. M. R. Caldwell of Doehler-Jarvis Corporation, a Past President of the Society, to serve as liaison to Committee B-8 on Electrodeposited Metallic Coatings, A. S. T. M. Mr. Caldwell will report to the Board on specification activities in which the Society is interested and arrange for review of proposed changes in joint A. S. T. M.-A. E. S. specifications.

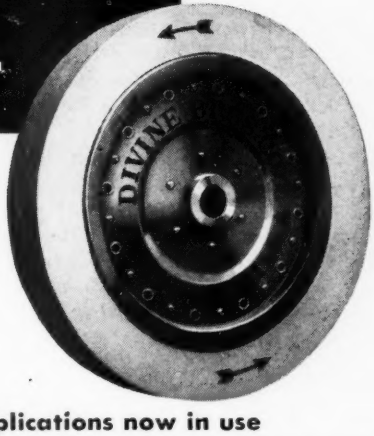
The Board also agreed to accept an invitation by the National Association of Corrosion Engineers through its Secretary, Mr. F. L. La Que, to appoint two members to participate in the activities of that Society. Mr. K. M. Huston of Armco Steel Corporation, Past President of A. E. S., and Dr. R. M. Wick of Bethlehem Steel Company, Past Chairman of A. E. S. Research Committee, have been asked to serve.

Echo from Atlantic City

Now that Winter is setting in, at least in some parts of the country, the accompanying photo may produce a much needed feeling of warmth. Sent in by Harvey Johnson of Belke Manufacturing Company, it shows an all-day fishing party on the Atlantic Ocean aboard the Sea-Foam.

Left to right: William Neill of Columbus Metal Products, Mr. Van Deventer of National Cash Register, Harvey Johnson of Belke Manufacturing Company, John Daymude of Crosley Radio, John Lockerbie of Goshen Plating Company, Mr. Farber of Westinghouse, Mr. Napacinski of Acme Galvanizing, R. J. Christian of National Cash Register, and Messrs. Parks and Damon Smith of Westinghouse.

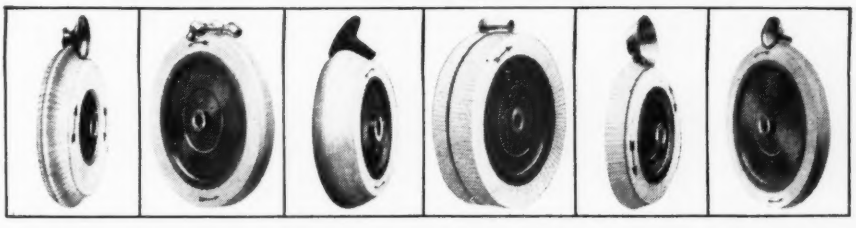
Fewer operations..more production
with the versatile DIVINE
COMPRESS
POLISHING WHEEL



Here's why Compress Wheels hold down your polishing costs!

- More area polished per pass
- More production because wheel heads last longer
- No ridging . . . no streaking
- Permanently maintained contour
- Perfect balance . . . smoother operation
- Absolute density control

Some of the thousands of applications now in use



The Compress Polishing Wheel is only one of many Divine products—Buffs, Polishing Wheels, Contact Wheels, Lathes, Automatics, and hundreds of other items! It's Divine for *the complete line!*

For complete information write for Divine Compress Wheel folder

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UTICA 1, N.Y., U.S.A.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 818.

Branch News

Coming Events

PHILADELPHIA BRANCH
ANNUAL EDUCATIONAL MEETING
AND BANQUET
Saturday, November 6 in
Broadwood Hotel

Educational Session at 1:00 P. M.

Dr. William Blum, Chemist, National Bureau of Standards, "Activities of the Government in Electroplating"

Dr. Walter R. Meyer, President, Enthone, Inc., "Preparation of Metals for Electroplating"

Mr. Myron B. Diggin, Technical Director, Hanson-Van Winkle-Munning Co.

Mr. William M. Phillips, Head, Electrochemistry Section, General Motors Research Laboratories Division

Banquet in the Evening
Floor Show—Dancing

Banquet Reservations: Write Tom Rogers, 1508 Hampstead Road, Penn Wynne, Pa., or phone Ardmore 5853-R

Hotel Reservations: Write Broadwood Hotel, Broad Street at Wood Street, Philadelphia 2, Pa., or phone Rittenhouse 6-6800

Welcome to this first affair since the War!
J. J. DUFFY, JR.

NEWARK BRANCH
ANNUAL CHRISTMAS PARTY
AND EDUCATIONAL SESSION
Saturday, December 18 in
Hotel Robert Treat, Newark
Plan now to come!
GEORGE WAGNER, *Secretary*

ADELAIDE BRANCH

MR. J. FLAVELL of A. Flavell Pty., Ltd., Melbourne, Victoria, at the May meeting, addressed the members on "Barrel Polishing" with special reference to the Rot. Process. Following his address Mr. Flavell showed several films of his recent trip to U. S. A. and gave several lines along which plating in America was developing.

The June meeting took the form of a visit to Tubular Steel Industries plant. An attendance record was set for this night, with over eighty members and friends being present. It was a thoroughly enjoyable evening during which members learned many things from this modern and well-laid-out plant. A supper was provided by courtesy of Tubular Steel Industries.

"Electropolishing" was the subject presented at the July meeting by MR. J. BLANCH, Chief Chemist and Metallurgist of Pope Products, Ltd. Mr. Blanch's very comprehensive and detailed paper covered both theoretical aspects and actual production procedure. Several samples of electropolished stainless steels added weight to his arguments and excited considerable comment from members present.

During July the Branch was gratified to learn that Mr. Blanch had been awarded the Florence Taylor Medal for 1947, an award for outstanding work in metallurgy. Mr. Blanch was the Branch's founder and first President.

"Polishing and Buffing" was the theme of the August meeting. MR. RON. CHURCH, foreman polisher of Pope Products, Ltd., delivered a very able and thorough paper on this subject, covering the complete field from setting up of wheels to making special jigs and spinners for production polishing. Although fundamentally a practical polisher, Mr. Church was quite at ease in addressing the members, and gave a thorough insight into the technical aspects of his work as well as practical hints.

C. J. COCKS, *Secretary*

BRIDGEPORT BRANCH

A very successful outing was held on August 28 on the estate of WILLIAM EHRENCRONA. The attendance was large, the weather perfect, the food and refreshments good. Everyone enjoyed himself immensely, including GEORGE MORROW's magic performance.

JOSEPH G. STERLING,
Secretary-Treasurer

BRIDGEPORT BRANCH

Several membership actions were taken at the regular meeting on September 3 in Hotel Barnum: One member, CHARLES PATAKY, had passed away and the Branch had sent flowers to his grave. Four applications for membership were received, and five members had to be suspended for non-payment of dues.

BRANCH LIBRARIAN R. MCNEIL reported that the Technical Sessions Committee had succeeded in arranging an excellent program for the coming year. Over 400 programs for the Open Meetings had been sent out. Supply houses and job shops will sponsor serving of sandwiches and beer at each Business Meeting.

The Bridgeport Public Library, according to its Librarian, Julian A. Schon, will review its holdings on plating and finishing and advise the Branch of proposed actions.

MICHAEL LOMBARD was appointed Assistant Sergeant-at-Arms.

PRESIDENT C. L. TEMPLE and A. R. MCNEIL gave a detailed report of the Atlantic City Convention, whereafter MR. FRANKLYN J. MACSTOKER, a member of the A. E. S. Constitution Revision Committee and Secretary-Treasurer of the New York Branch, discussed the new Constitution and By-Laws and the work of A. E. S. Research Committee.

After adjournment, MacDermid, In-

Siebert M. Johnson

Siebert Johnson died in the W. C. A. Hospital in Jamestown, N. Y., on Monday, September 6, after a long illness. Born in the same city on May 30, 1895, he was only 53 years old.

Johnson started in the plating industry as a buffer. In the 1920's he and his brothers organized the Jamestown Plating Works with Siebert assuming the duties of President and General Manager. By conscientious attention to detail and hard work he made this company one of the finest job plating shops in Western New York. Having sold it in 1946, he entered the employ of the Chautauqua Hardware Company with which he remained until a few days before his death.

One of the founders and a Past President of the Buffalo Branch of the American Electroplaters' Society, Johnson retained his enthusiasm for the Society to the last. He was also a member of the Lutheran Emanuel Church, the Leif Ericson Lodge, and the Lakewood Rod and Gun Club. An overseas veteran of World War I, he belonged to the Disabled American Veterans, Veterans Recreation, Inc., Battery C Organization, and the American Legion.

Johnson was one of those sympathetic, kindly and self-sacrificing men who thought not of self but of others and made friends wherever he went. His passing is mourned not only by his family, consisting of his wife, Bertha Rupp Johnson, his two daughters, Mrs. Donald Juhl of Collins, N. Y., and Miss Eileen L. Johnson, his two sisters and three brothers, but by all who came in contact with him. A good man has gone to his reward.

A. E. S. PUBLICATIONS

Clearance Sale of Proceedings

34th ANNUAL PROCEEDINGS

Complete volume of technical and scientific papers presented during the 1947 A. E. S. Convention

Plating Room Waste Disposal; Barrel Nickel and Chromium Plating; Electroforming Applications; Evaluation of Porosity and Thickness of Electrodeposits; Effects, Determination and Removal of Impurities in Plating Baths; Conversion Coatings on Zinc; Buffing of Copper and Nickel Deposits; Chemical Deposition of Nickel and Cobalt; Stress in Nickel Coatings; Physical Properties of Electrodeposited Nickel and Chromium; Methods for Determining Polarization. Price reduced from $10.00 to $6.50.

33rd ANNUAL PROCEEDINGS

Complete volume of papers presented during the 1946 A. E. S. Convention

Twenty-one papers on copper, nickel, rhodium and tin plating; plating of strip and wire screen cloth; electrocleaning and electropolishing; magnesium treatment and parkerizing; polishing and buffing; organic coatings, etc. A. E. S. Research Annual Reports. Price reduced from $6.50 to $5.50.

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corporated of Waterbury, Conn., was the host in serving refreshments.

JOSEPH G. STERLING,
Secretary-Treasurer

BUFFALO BRANCH

The Branch resumed activities on September 10 with a successful picnic. The food and drink, adequate though they were, took a back seat to the hotly contested baseball battle between the Buffalo Rats and the Rochester Skunks. "SPITBALL" KIRCHOFF of the Rats took stellar honors for his fancy work on the mound. "CURLY" RUFF starred behind the plate, and poled out a few long ones that hit pay dirt. The official scorekeeper stopped counting after the Rats had scored their twenty-fourth run. The Skunks also scored three runs that we know of. All in all, a grand time was had by all.

On a more somber note, the Branch regrets the passing of SIEBERT M. JOHNSON on September 6. His joviality will be sorely missed by all and his love and enthusiasm for A. E. S. will always be remembered. We cannot help but feel that Siebert's first remarks on entering the Pearly Gates will undoubtedly deal with the inferior quality of the plating in the place. Rest in Peace! We'll never forget you!

H. A. FUDEMAN, *Secretary*

CHICAGO BRANCH

MR. STANLEY KRENTEL of MacDermid, Inc., spoke on "Bright Copper Plating" at the meeting on September 10, attended by one hundred and thirty. He presented a well-planned paper listing advantages as well as difficulties that may be encountered with bright copper. Brightness of plate was claimed to approach that of bright nickel deposits.

Five new members were received. A report on the Annual Convention in Atlantic City was given. A request was made that the members place emphasis on obtaining new sustaining members for the Research Committee.

The Branch meetings will continue to be held on the second Friday of each month at 8:00 P. M. in Atlantic Hotel. Interesting speakers have been assured for every meeting.

ARTHUR G. BARTMANN,
Correspondent

CLEVELAND BRANCH

The first Fall meeting was held on September 10 in the Demonstration Room of Behr-Manning's Cleveland Industrial Division.

LIBRARIAN HOWARD BLOUCH introduced MR. GORDON G. THOMPSON of Behr-Manning, who spoke briefly on polishing belt applications in electroplating and then invited those who had brought samples to submit them for processing on the demonstration polishing machine. Much interest was expressed in belt grinding and polishing, especially after witnessing a few rapid-cutting and polishing feats by the demonstrators.

An enjoyable evening was capped by the excellent refreshments served later in the evening.

HARRY POCHAPSKY, *ecretary-Treasurer*

DAYTON BRANCH

The first regular meeting of the season was held on September 10. All other meetings will be held on the first Friday of each month.

A motion picture, "The Story of Nickel", and a lecture on "Production Copper Plating" by MR. C. W. POWELL of the National Cash Register Company of this city made the meeting very interesting and instructive. The film began with the mining and smelting of nickel ore and ended with the rolling of sheet. Mr. Powell's talk dealt with copper plating for selective carburizing and nitriding as applied in the production of cash registers. He also dwelled on racking of very small parts not suitable for barrel plating and on handling of parts to prevent rejections and other difficulties.

LIBRARIAN BILL CRYDERMAN deserves special thanks for preparation of this excellent program.

FRED BAUCH, *Secretary*

GRAND RAPIDS BRANCH

MR. FRANK K. SAVAGE was the featured speaker on September 10. His ably presented topic, "Plating Racks", was of great interest to the seventy-odd members who were present.

Several committee chairmen for the Annual Dinner-Dance on January 29 were appointed by the President, L. B. SPERRY.

A buffet luncheon was served following the meeting.

JACOB M. HAGE, *Secretary*

JACKSON-LANSING BRANCH

The first meeting of the 1948–1949 season was held on September 14 in Hotel Porter, Lansing, Mich. MR. E. E. MURRAY, President of the Murray-Way Corporation, Detroit, was the principal after-dinner speaker with a very interesting discourse on "Buffing and Polishing". An extra added attraction was MR. A. R. PUTNAM, Advertising Manager of PLATING, who gave a short speech on the problems of the magazine.

The officers for the coming year (see last issue) were introduced to the forty-odd members present and the meeting was adjourned with the showing of motion pictures made by the Michigan Department of Conservation. The next regular meeting will be held at 6:30 P. M. on October 12, in Hotel Hayes, Jackson.

L. M. HENDERSON,
First Vice-President

LANCASTER BRANCH

Sixty-seven members and guests attended the annual picnic on August 21. PRESIDENT CHARLES SNYDER was the host, his Clark's Creek farm the place. Following swimming and boating we were first entertained at a softball game in which Snyder's plating shop team was narrowly defeated by the pick of those present and then bruised by the guns in the ruthless destruction of clay pigeons. Finally we were filled with marvelous ham and baked beans prepared by our host's good wife. It was a good picnic at which we were warmed not only by the sun but by the friendship about us.

C. W. SMITH, *Secretary-Treasurer*

LANCASTER BRANCH

Twenty-three members of the Lancaster Branch and their guests attended the regular September meeting at the Stock Yards Hotel. This dinner meeting was climaxed by the illustrated lecture by MR. M. V. MOLL of Hanson-Van Winkle-Munning Company. He demonstrated very effectively the possibilities and practicabilities of automatic plating machinery in both the job shop and mass production work. His discourse on the type of racking for non-specialized applications was particularly interesting.

One new member was welcomed.

C. W. SMITH, *Secretary-Treasurer*

LOUISVILLE BRANCH

The first meeting of the 1948–1949 season was held on September 16 in the "Grotto", a temporary meeting place. It was announced that the regular meeting place for all future meetings will be Room 119, Speed Scientific Building, University of Louisville.

After a short business session, LIBRARIAN TOM ALLISON introduced MR. MARTIN GLENN, noted industrial relations lawyer. Mr. Glenn outlined the laws which affect labor relations, laws with which all executives, supervisors, and labor leaders should be familiar, including garnishments, workmen's compensation, social security, etc., and concluded with a thorough presentation of the Taft-Hartley law and its provisions. Mr. Glenn's authoritative information and easy manner of delivery held the full attention of the members, who then gathered around him to ask questions and express their appreciation.

STANLEY J. BEYER, *Secretary-Treasurer*

MELBOURNE BRANCH

Twenty-seven members and three visitors attended the 36th Regular Meeting held at the Chamber of Manufactures on August 23, when Mr. D. W. Glanvill spoke on "The Use of Electroplating in Aircraft Maintenance".

The speaker, who is foreman in charge of the electroplating and heat treatment shops of Trans Australia Airlines at Essendon, dealt with several interesting applications of electroplating rarely in-

cluded in general plating practice. Of particular interest were his remarks about indium plating, which finds application usually over lead as a cylinder bearing surface.

A feature of this talk was the prolonged and keen discussion which it provoked, questions ranging from enquiries on detailed procedure in the speaker's plating shop to general discussion as to the merits and demerits of cadmium and zinc plating.

N. L. CARTER,
First Vice-President

NEWARK BRANCH

Fifty members and guests attended the first Fall meeting on September 17 in Robert Treat Hotel.

Two new members were elected and one application for membership was received. The Secretary was instructed to prepare a list of delinquent members for the purpose of suspension, immediately following November 1 for those in arrears one year or more and February 1 for those under a year. Final announcements of delinquency will be sent to the offending member one month prior to these deadlines.

EDWIN BOWERMAN and ROBERT HERWIG were elected to serve on the Branch Research Committee, with the former as Chairman.

Librarian Bowerman then introduced MR. S. A. LEWIS, Sales Engineer with U. S. Stoneware Company, who spoke on the timely subject, "Corrosion Resistant Materials Available to the Electroplaters". While describing the products used to stop corrosion of equipment and flooring in a plating room, he supplied the audience with samples for personal inspection. To afford protection to metal from mild corrosive liquids or gases, he offered the vinyl resin coatings produced by several applications of Tygon paint. These paints require primers to secure the maximum adhesion to the metal.

For severely corroding liquids, he had on hand to show sheeting, 3/32 to 1/8 inch thick, made of rubber, vinyl resins, or bituminous materials, which could be applied to metal surfaces with heat and cement. These sheets form the basis of tank linings, the vinyl resin type being the easiest to repair. In case the plater wishes to dispense with coating materials for his tanks, he can purchase chemical stoneware equipment at slightly higher cost. Care must be exercised in heating especially the rectangular crocks because of danger of cracking.

For intermittent corrosive action, such as on plating racks, there are applied air dried or baked coatings of vinyl resin. A novel type of coating that allows for a build-up to as high as ¼ inch in one dip is Plastisol, the thickness depending on the heat content of the metal to be coated prior to the dipping.

For flooring in the plating shop acid-proof bricks may be laid over the concrete foundation with proper sealing cement. A silicate type of cement is best for floors subjected to chromic acid.

A question and answer period which followed the speaker's fine presentation dealt with inflammability of vinyl tubing, phosphate undercoatings for vinyl-resinated materials, baking operations, methods for placing stoneware tanks on cement floors, and other problems.

SAMUEL FREY, *Recording Secretary*

NEW HAVEN BRANCH

The opening meeting of the Fall season, held in Sterling Chemistry Laboratory of Yale University on September 14, had a large attendance. LIBRARIAN MALCOLM ORR introduced MR. HAROLD NARCUS, President and Technical Director of Electrochemical Industries, Inc., Leominster, Mass., who spoke on "The Cupron Process". With the help of slides the speaker described this new practical method of plating non-conductive materials, especially synthetic resins, employing reduced copper films in lieu of the currently used silver films. Their advantages were discussed in detail with particular reference to the quality of the plated plastic product, to the elimination of ever-present hazards encountered in the use of the silvering process, and to the economical aspects. The necessary techniques, solutions and equipment used to produce strongly adherent and continuous copper films capable of receiving a good subsequent electrodeposit were given.

DR. WALTER MEYER and HENRY SMITH led in a question period, lasting one hour, which concluded this interesting platers' session.

B. J. GAFFNEY,
Secretary-Treasurer

PHILADELPHIA BRANCH

The first meeting of the Fall season was a dinner meeting held at the Broadwood Hotel on September 24, attended by about fifty members.

Featured was the first Annual George Gehling Memorial Lecture, established last June in honor of the late George Gehling, Past President and Secretary of the A. E. S. and long-time member of the Philadelphia Branch. DR. A. KENNETH GRAHAM of Graham, Crowley & Associates, Inc., and Executive Secretary of the A. E. S., had been selected by the Board of Managers to deliver the lecture. He was introduced by LIBRARIAN ALBERT HIRSCH, long an associate of Mr. Gehling and responsible for the resolution which established the lecture.

Dr. Graham's paper dealt with "Practical Aspects of Brass and Bronze Plating" and will appear in article form in a future issue. The very interesting discussion that followed testifies to the interest of the listeners. It was an auspicious beginning to what is hoped to be a long series of plating lectures.

ALBERT HIRSCH was appointed as Chairman of the Branch Research Committee. J. J. DUFFY, JR., a member of the Branch, has been appointed to the Research Finance Sub-Committee as Vice-Chairman in charge of the Eastern Branches.

DR. SAMUEL HEIMAN, First Vice-President, re-inaugurated the Question Box. Several interesting questions concerning nickel and spotting of silver plate provoked a lively discussion.

I. WILLIAM MARCOVITCH, *Secretary*

PITTSBURGH BRANCH

Forty-three members heard MR. H. J. MCVEY of Parker Rust Proof Company give an interesting and educational talk on the "Preparation of Metal Surface Before Painting" at the first meeting of the 1948–1949 season on September 9 in Hotel Sheraton.

The regular meetings will be held in the Avon Room of the Sheraton Hotel on the second Thursday of each month.

GLADE B. BOWMAN, *Secretary*

ROCHESTER BRANCH

The opening Fall meeting was held in Room 120, of the Eastman Building, Rochester Institute of Technology on September 17.

The business meeting was postponed until the last in deference to our guests from the Research Committee of the A. E. S., who were in Rochester for their quarterly meeting and had to make early train connections. PRESIDENT FLINT introduced A. E. S. Executive Secretary DR. A. K. GRAHAM, who spoke extemporaneously about the affairs of the Society and of the Research Committee. Dr. Graham then introduced the following members of the Research Committee: DR. LOUIS WEISBERG, Chairman, DR. WILLIAM BLUM, MR. B. C. CASE, MR. GUY COLE, DR. W. A. WESLEY, and DR. RALPH SCHAEFER.

MESSRS. WALTER SWANTON and JAMES WEAVER then described the training program in Metal Finishing to be given by Rochester Institute of Technology. After comment and suggestions by Dr. Blum and other guests, the members and guests viewed the Metal Finishing Laboratory which has been installed.

The Branch decided to support the Research Program by donating $200.00 to the Research Fund.

HENRY CAMERON was elected an Honorary Member of the Branch in honor of his faithful service during a period of over twenty years.

Six applications for membership were received.

JAMES WEAVER, *Secretary*

ST. JOSEPH VALLEY BRANCH

Sixteen were present at the dinner and

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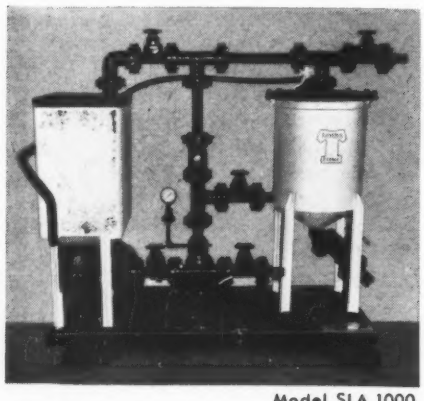

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twenty-nine at the business and technical session of the September meeting.

LIBRARIAN MEL BEREMAND introduced MR. TWYNING of the J. C. Miller Company who gave a very interesting talk on "Buffing Compounds and Their Cleanability". His discussion dealt with the composition of a number of types of compound for buffing brass, nickel, and stainless steel and the chemistry of the components of these compounds in relation to their function in the buffing compositions.

A question and answer period followed.

V. E. PETERSON, *Secretary-Treasurer*

SOUTHEASTERN BRANCH

The featured speaker on the evening of September 9 was MR. HERMAN J. STRUCKHOFF of Lasalco, Inc., St. Louis, Mo. His talk on "Barrel Plating" was greatly enjoyed by the small group in attendance as proved by the number of questions asked during the evening. We wish to extend our thanks to both Mr. Struckhoff and Lasalco for a most pleasant evening.

WILLIAM T. WEYMOUTH,
Secretary-Treasurer

SPRINGFIELD BRANCH

At the first Fall meeting on September ber 27 in Hotel Charles action was taken to alleviate difficulties arising under the new by-laws. Dues will be payable at the January meeting and not later than the March meeting for the ensuing fiscal year. In this way the Branch will be able to submit to the Society its list of bona-fide members before the summer recess.

A Branch Research Committee was appointed, consisting of JAMES LAING, Chairman; JOHN COSTIGAN and WAYNE SANDERS. A special meeting of the Board of Managers was called to meet two weeks later to begin work on plans for the Regional Meeting which will be held in Springfield in the Spring.

The guest speaker, MR. HUBERT M. GOLDMAN, chose as his subject, "Metal Finishing by Abrasive Tumbling". A large assortment of samples that had been finished by abrasive tumbling were used to illustrate his points. An active question period followed the well-presented talk on this most timely subject.

HAROLD OEHLER, *Secretary*

SYDNEY BRANCH

The meeting on September 14 took the form of a plant visitation to the Metal Finishing Section of the Australian General Electric Company's Works in Auburn, Sydney and was attended by eighty members and visitors.

The extraordinary interest shown in the automatic nickel plating installation was emphasized by the record number of members present. The plant was in full operation at the time of the visit, and the visitors were reluctant to leave when the time came.

A short business session was then held at which two new members were elected and a discussion was held on matters pertaining to the plant.

The members then adjourned to the works cafeteria where the company management provided an excellent supper. F. HEARD supported by W. POPE proposed thanks to the company and to E. WRIGHT and J. GODFREY, President and Secretary, respectively, of the Branch, who had arranged the visit.

MR. J. STRICK, Works Manager of the A. G. E. Company, replied to the toast and said that the Company was only too pleased to do all it could to help the Society in its aims to improve the science of electroplating, and also welcomed the opportunity to show the modern plating plant.

J. GODFREY, *Secretary*

SYDNEY BRANCH

At the regular meeting on August 10, PRESIDENT WRIGHT presided over the thirty-three members and visitors who attended to hear MR. R. F. HAREN of Standard Telephone and Cables, Ltd., give a talk on the use of rectifiers in the plating industry. Mr. Haren had just returned from a tour of the world in connection with new developments in rectification and gave an interesting couple of hours' resume of the plating techniques in the countries which he visited.

During the business session two new members were elected and the President presented B. W. ARMSTRONG with his Past President's Badge.

The Secretary reported that there had been eighty-two food parcels sent to the members of the Electrodepositors' Technical Society in England and that an additional twenty names had been sent for. Practically all who had received parcels had acknowledged them and expressed their appreciation.

J. R. GODFREY, *Secretary*

SYRACUSE BRANCH

The first meeting of the new season was held in General Electric's new Electronics Park on September 20. The sixty-five members present were conducted on a tour of the plant after which General Electric was host at a steak dinner in the plant cafeteria.

The business meeting was held in the auditorium with PRESIDENT GEORGE SIMMONS in the chair. The possibility of buying a projector to show educational films was discussed, and it was decided to rent one for a few meetings to try it out. GEORGE LAWRENCE was delegated to find a suitable meeting place for the rest of our meetings.

Following the business meeting there was an interesting discussion of shop problems in which many members participated.

V. P. MCCONNELL, *Secretary*

Membership Report

of the American Electroplaters' Society

Elections

ADELAIDE BRANCH: J. Cockington, H. K. Kahan, A. Lambert, P. Nolan, (R. Mitchell erroneously published as elected in the July issue)

INDIANAPOLIS BRANCH: J. W. Wilson

JACKSON-LANSING BRANCH: R. F. Simpson, E. F. Strefling

LANCASTER BRANCH: J. Kurtz Brubaker.

LOS ANGELES BRANCH: Jack W. Dunn

MELBOURNE BRANCH: W. T. Fielder, R. H. Keller

NEW HAVEN BRANCH: Clark A. Brown, Edward F. Busby, Maurice J. Leahy, William K. Murray, John J. Odoy

NEWARK BRANCH: Charles W. Ange, Edward A. Hill, Frank L Kincaid

NEW YORK BRANCH: Curtis Klemens, Charles K. Turner, Joseph Di Zefalo

PITTSBURGH BRANCH: Edward J. Hassell

SAGINAW VALLEY BRANCH: Fred Aston, George Carter

SPRINGFIELD BRANCH: G. B. Sampson

SYDNEY BRANCH: A. Bruce, J. R. Eyre, L. Hopkinson, E. Merriman

TORONTO BRANCH: Ernest J. Bainbridge, Edward T. Fergusson, Walter E. Mark, Douglas E. Paton

Reinstatements

ADELAIDE BRANCH: L. Goble, M. C. Stewart

LOS ANGELES BRANCH: Joseph M. Clark

NEW YORK BRANCH: Robert Corey, Karl Fifer, Walter J. Manson

Transfers

William D. Gordon from Cleveland Branch; Oscar W. Kuntz from Cleveland Branch; Donald H. Morris from Cleveland Branch; Edison C. Sickman to Indianapolis Branch; Vernon A. Nieberlein from Indianapolis Branch; Thomas Laken from Milwaukee Branch; William S. Levine from Philadelphia Branch; F. E. Snyder from Philadelphia Branch; Carl J. Swartz from Philadelphia Branch; (E. B. Sanigar erroneously published as having out-transferred from the Philadelphia Branch); John Davidson to Pittsburgh Branch; George Jernstedt from Newark Branch to Pittsburgh Branch; S. T. Cheng from Pittsburgh Branch to Mem-

(*Continued on page 1172*)

MEMBERSHIP CHART

	Membership May 1, 1948*	New Members	Net Change in Membership	Per Cent Net Change
FIRST GROUP				
TORONTO	143	9	+ 9½	+ 6.6
CLEVELAND	190	10	+ 8½	+ 4.5
BOSTON	163	3	+ 3	+ 1.8
DETROIT	399	6	+ 6	+ 1.5
NEWARK	273	8	+ 3½	+ 1.3
BRIDGEPORT	154	6	− 2	− 1.3
LOS ANGELES	234	1	− 3	− 1.3
GRAND RAPIDS	140	..	− 2½	− 1.8
CHICAGO	453	8	− 9	− 2.0
NEW YORK	270	9	− 6	− 2.2
PHILADELPHIA	205	7	− 8	− 3.9
WATERBURY	128	2	−11½	− 9.0
HARTFORD	152	..	−19½	−12.8
PITTSBURGH	149	1	−21½	−14.4
SECOND GROUP				
SYDNEY	91	22	+23	+25.2
NEW HAVEN	110	5	+ 5	+ 4.5
BUFFALO	96	5	+ 2½	+ 2.6
MILWAUKEE	120	6	+ 3	+ 2.5
INDIANAPOLIS	103	2	+ 2	+ 1.9
PROV.-ATTLEBORO	117	5	+ 2	+ 1.7
TWIN CITY	77	2	+ 1	+ 1.3
SAN FRANCISCO	77	..	.....	.....
DAYTON	90	..	.....	.....
ST. LOUIS	103	..	.....	.....
ST. JOSEPH VALLEY	98	..	− ½	− 0.5
BALTIMORE-WASH.	97	..	− 5½	− 5.7
ROCHESTER	120	3	− 9½	− 7.9
CINCINNATI	80	2	−12½	−12.8
THIRD GROUP				
SAGINAW VALLEY	38	7	+14½	+38.2
MELBOURNE	67	12	+12	+17.9
ADELAIDE	66	13	+ 9	+13.6
COLUMBUS	38	5	+ 4½	+11.8
LOUISVILLE	18	2	+ 2	+11.1
MONTREAL	63	3	+ 3½	+ 5.6
LANCASTER	46	2	+ 1	+ 2.2
SYRACUSE	66	8	+ ½	+ 0.8
ROCKFORD	59	..	.....	.....
JACKSON-LANSING	64	2	− 1½	− 2.3
SPRINGFIELD	53	1	− 2	− 3.8
TOLEDO	73	..	− 3	− 4.1
SOUTHEASTERN	49	2	− 7	−14.3
OTHERS	113	27†	+28½	+25.2
TOTAL A. E. S.	5,249	207	+24	+ 0.5
Active Membership, October 5, 1948			5,273	

*From the Annual Report and subject to corrections.

†Including 21 in Allentown-Reading Branch.

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(*Continued from page 1171*)

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PHILADELPHIA BRANCH: E. H. Thomas, E. B. Sanigar
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PITTSBURGH BRANCH: Gene C. Edwards, H. D. Holler, Stewart H. Jones, Samuel W. McClemons, Ralph D. Manon, Donald H. Miller, Lloyd A. Taylor, Dennis R. Turner, William H. Wooster, Sr.
SOUTHEASTERN BRANCH: John A. Hauser, W. F. Pfaff
BRIDGEPORT BRANCH: F. W. Sheehan, E. F. Wiess

Deaths

BRIDGEPORT BRANCH Charles Pataky
BUFFALO BRANCH: Siebert Johnson
JACKSON-LANSING BRANCH: F. Sylvester

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If those who do not plan to keep their copies would send them to P. O. Box 168, Jenkintown, Pa., their assistance will be very much appreciated.

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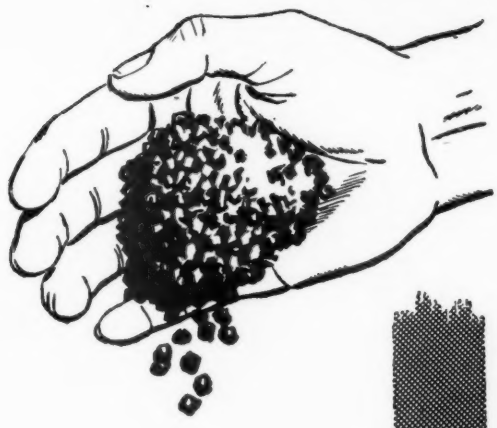

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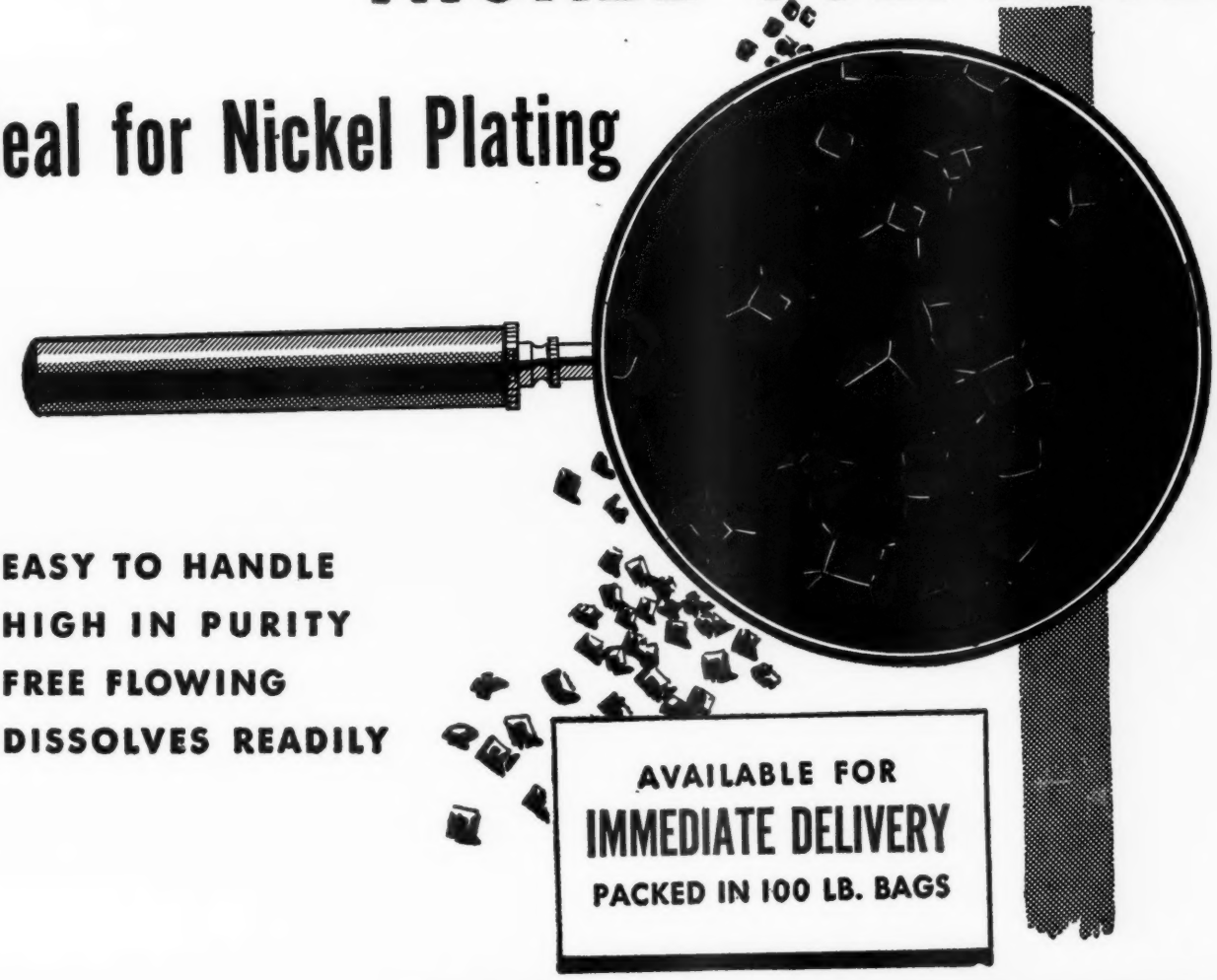

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Question Box

(*Continued from page 1127*)

slight agitation, according to C. L. Faust et al in their paper, "Copper Plating in Alkanesulfonic Acid Baths" which appeared in the May and June, 1947 issues of THE MONTHLY REVIEW. Hence something approaching 500 asf should be possible if conditions are right.

Mention should be made of the poor conductivity of stainless steel for electricity and heat. It is therefore necessary to do a good job of racking, using a sufficient number of high-pressure contact points and contacts of high conductivity and large cross section to carry away any heat evolved.—K. G. SODERBERG.

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Q. 29. Here at R. Wallace & Sons Manufacturing Company we employ with very satisfactory results a cycle on lead alloy trophy figures and on holloware with lead alloy mounts which is similar to that given by M. B. Diggin. However, we have also been able to plate these items by going directly into the silver strike following step 9 (rinse after electrocleaner). The average current density in the strike is of the order of 10 to 15 asf or just enough to give a slight gassing on the edges; the time is approximately 1 minute. In our experience, if higher current densities are employed, the lead parts darken and are not covered in the silver strike. They then do not plate properly in the silver plating tank. Although this variant will give satisfactory results in the hands of experienced platers, it is usually safer to employ the complete cycle as listed by Mr. Diggin.

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(Continued on page 1176)

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(Continued from page 1175)

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